FOOD MANUFACTURE

incorporating Food Industries Review

NARD HILL LIMITED, STRATFORD HOUSE, 9 EDEN STREET, LONDON, N.W.1 FEBRUARY 1, 1956

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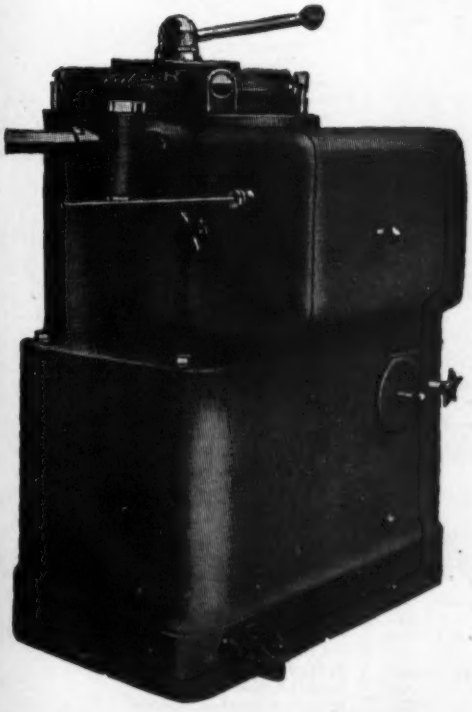

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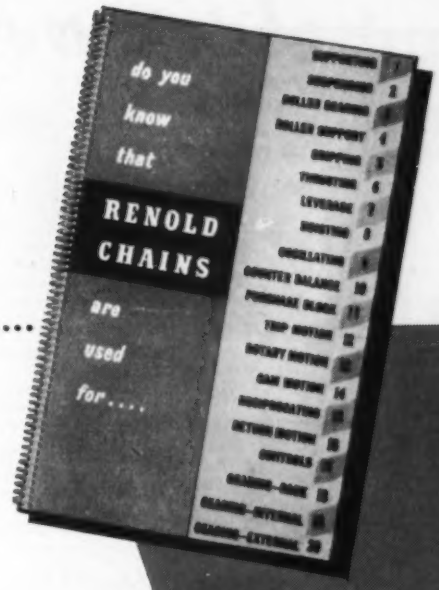

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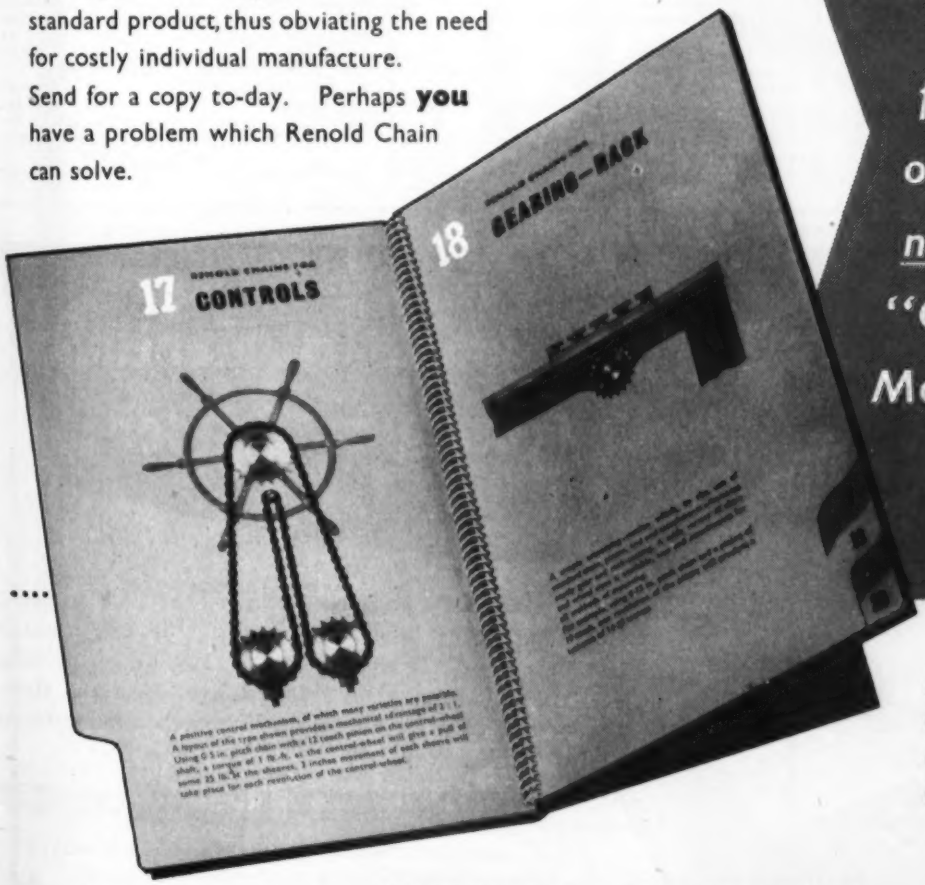

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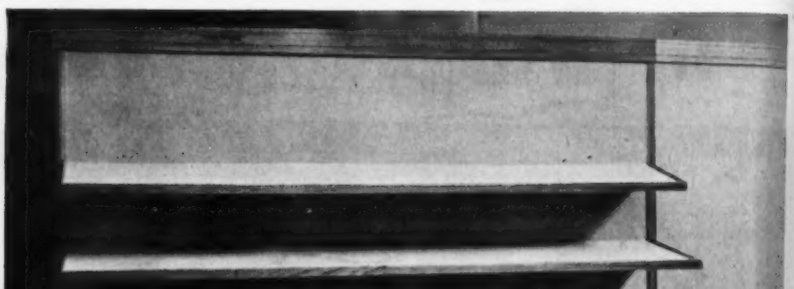

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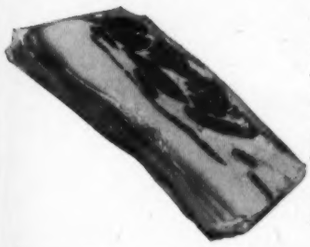

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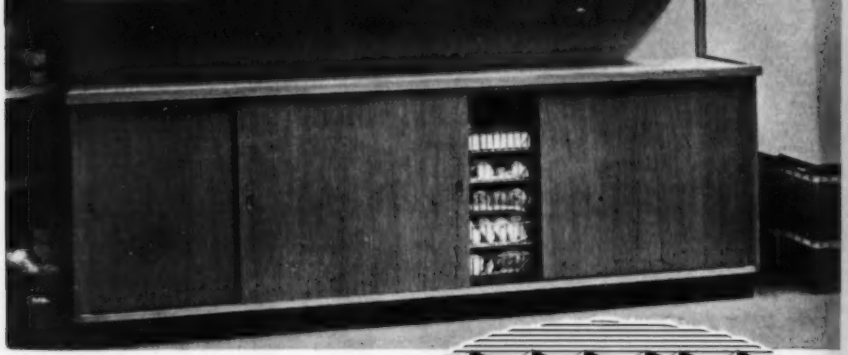

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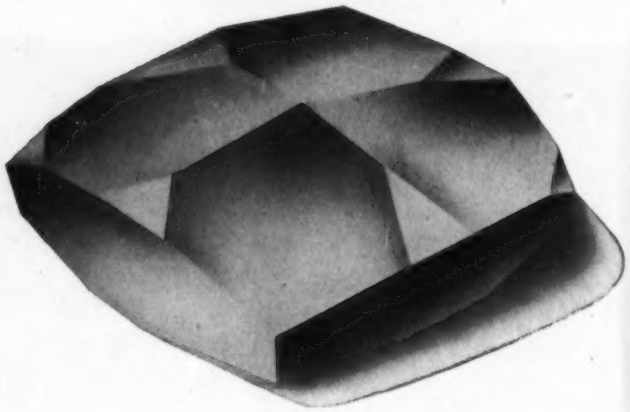
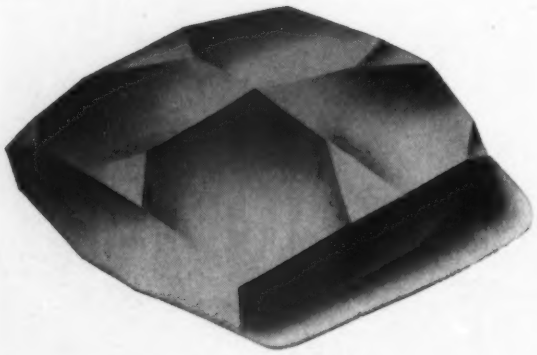
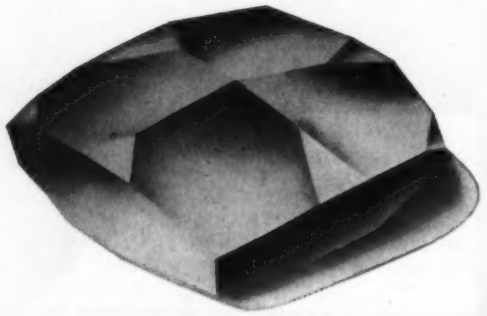


STURGE

CITRIC ACID





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Manufacturers of fine chemicals since 1823

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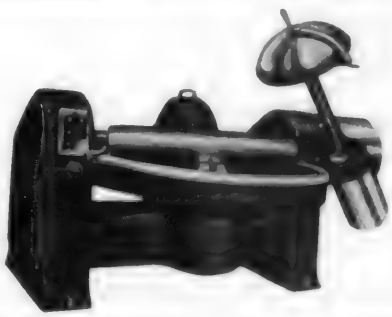
'Bring down costs of production' *says Minister*

"At present we need more beef; and more mutton if costs can be brought down. At least as many pigs we have provided [illegible]

Here is your way

Use THE WELL KNOWN Strømmen MACHINES



1 45 gallons Sausage Bowl Chopper with self emptying device: The machine with great efficiency for rapid large scale production.

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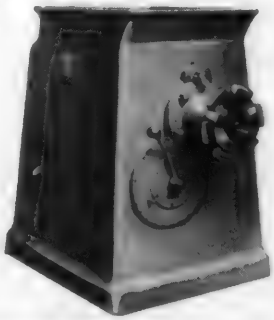
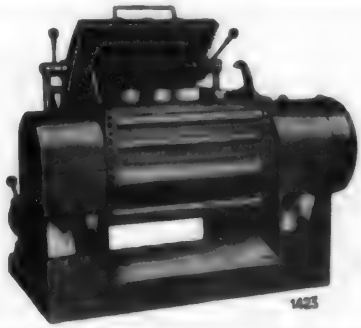
Self-Feeding Meat Mincer, capacity 2½ to 3 tons per hour, with built-in friction clutch and roller bearings. Smooth surfaces, easy to clean.





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4. Attractive colour and bloom which is retained up to the time of cooking.	4. The immediate action of M.S.B. will seal in the natural juices of the fresh meat. THIS prevents discolouration.
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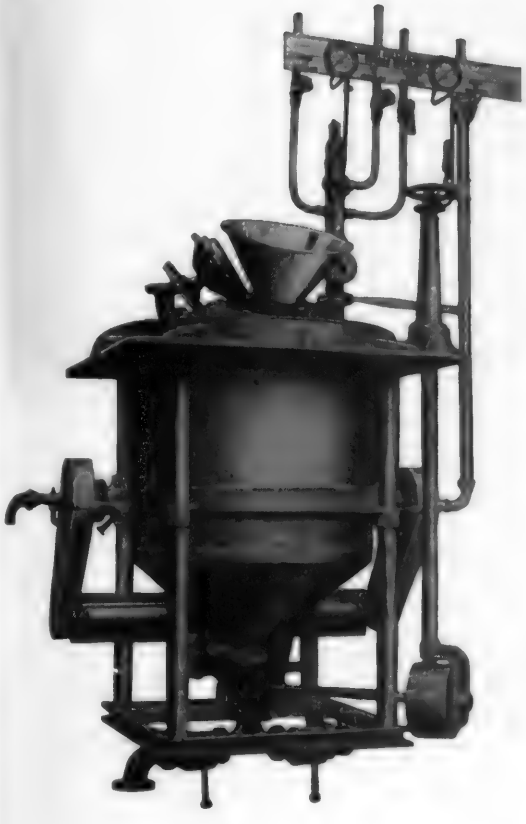

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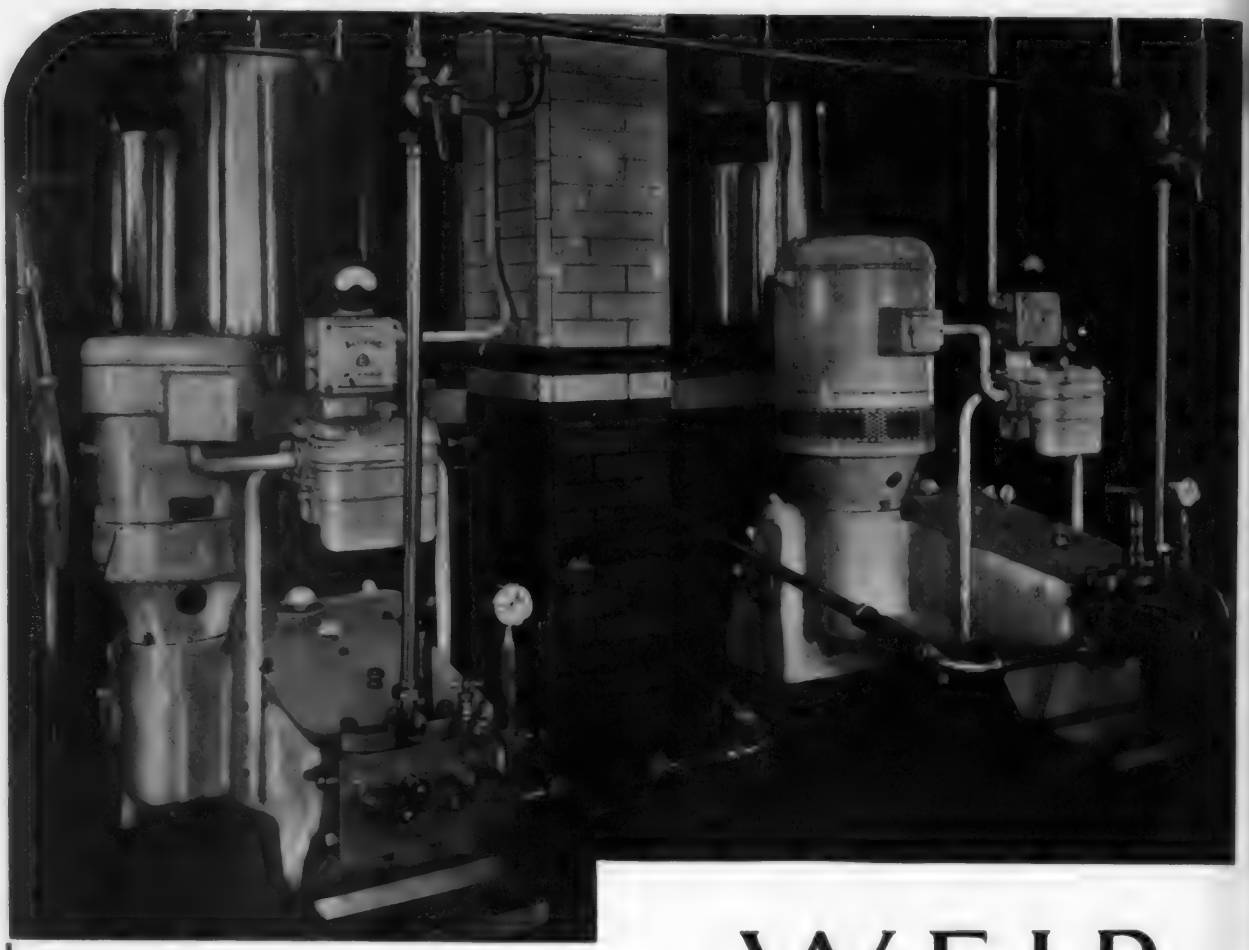

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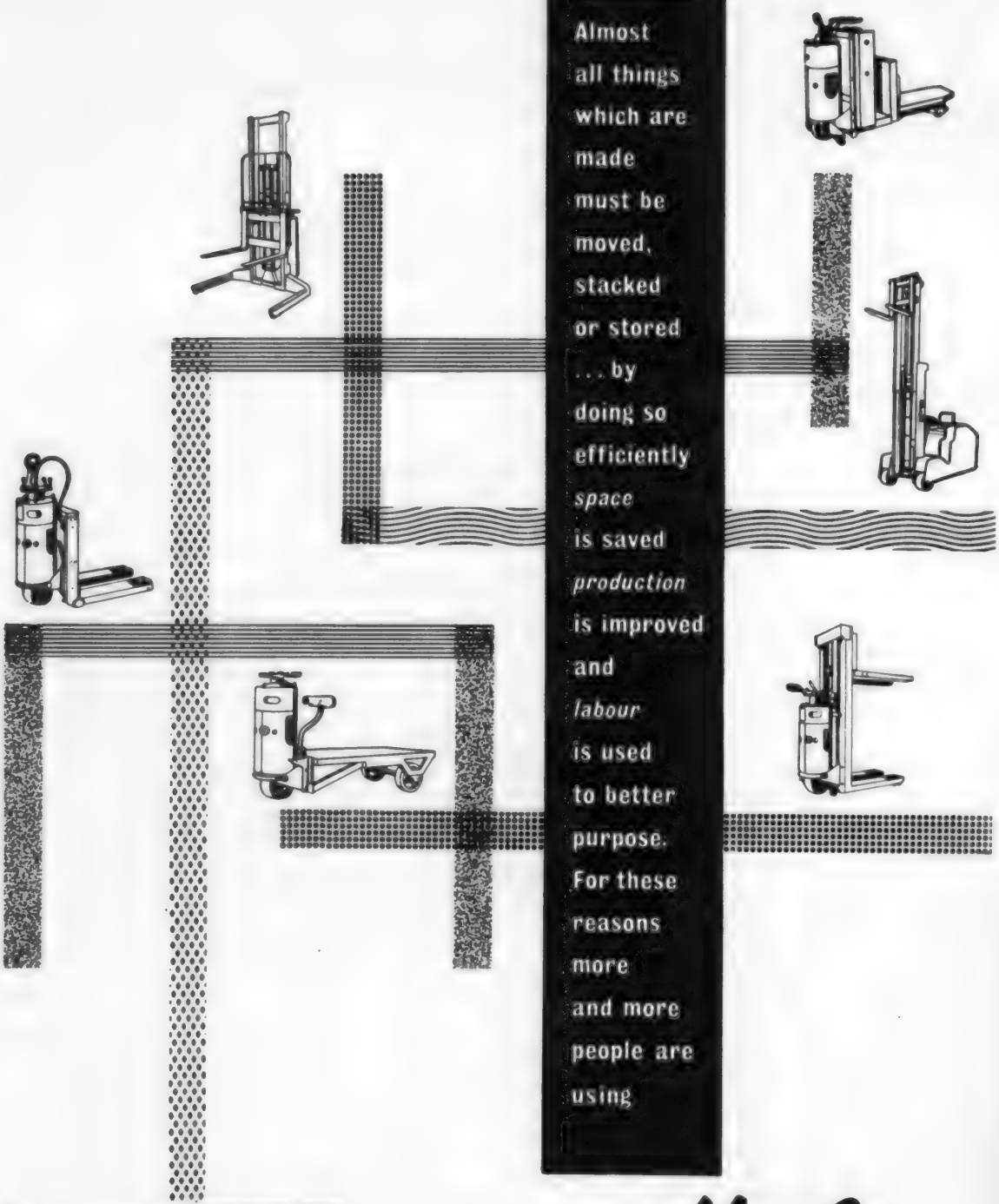

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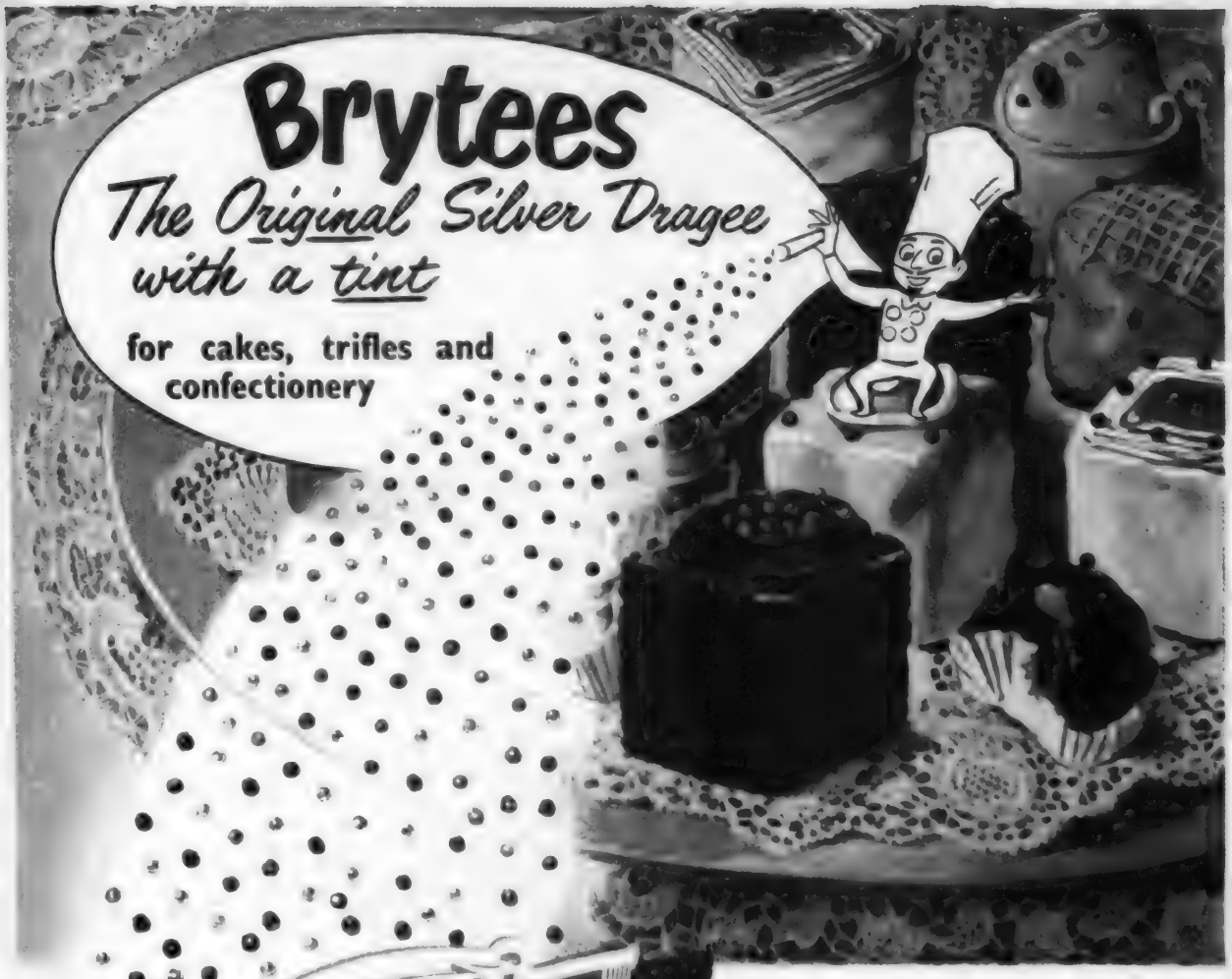
Brytees

The Original Silver Dragee with a tint

for cakes, trifles and confectionery



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Available in bulk or prepacked in this attractive display carton

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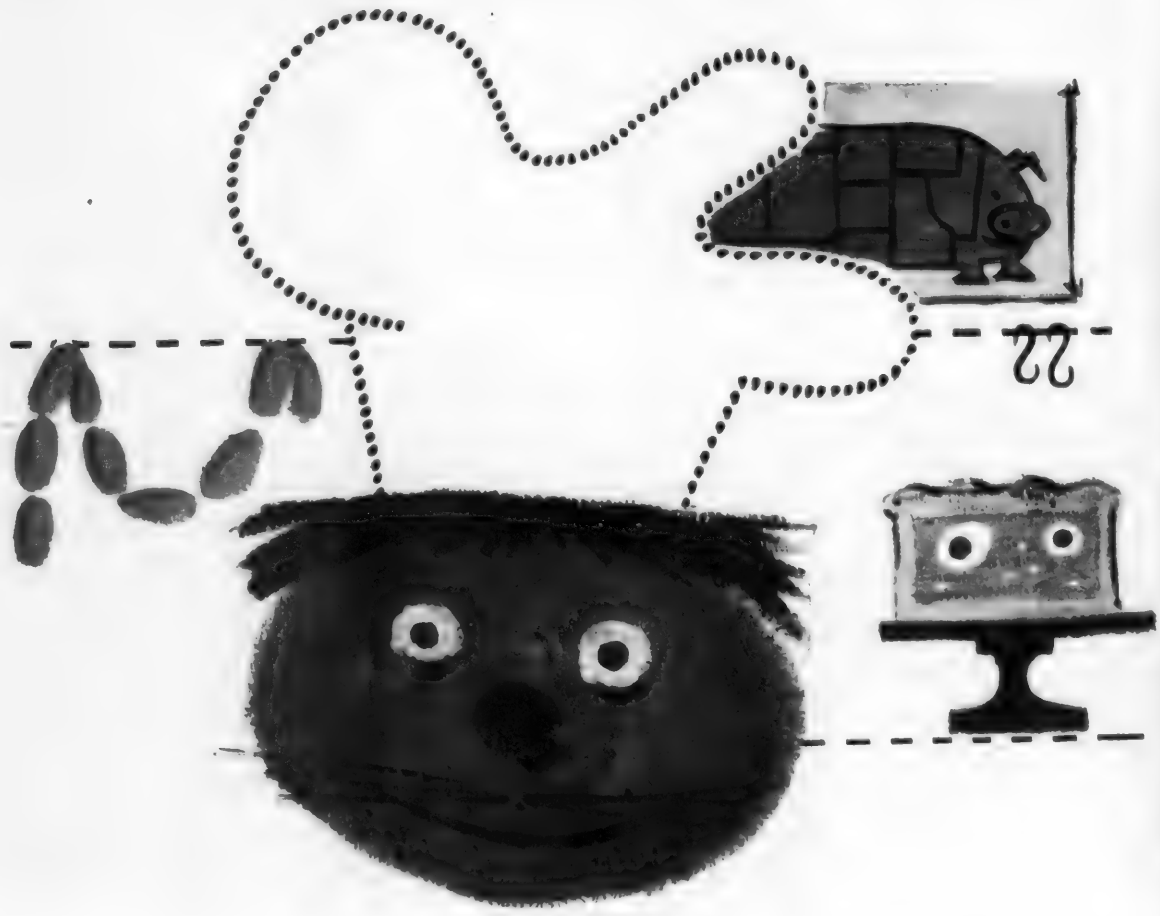

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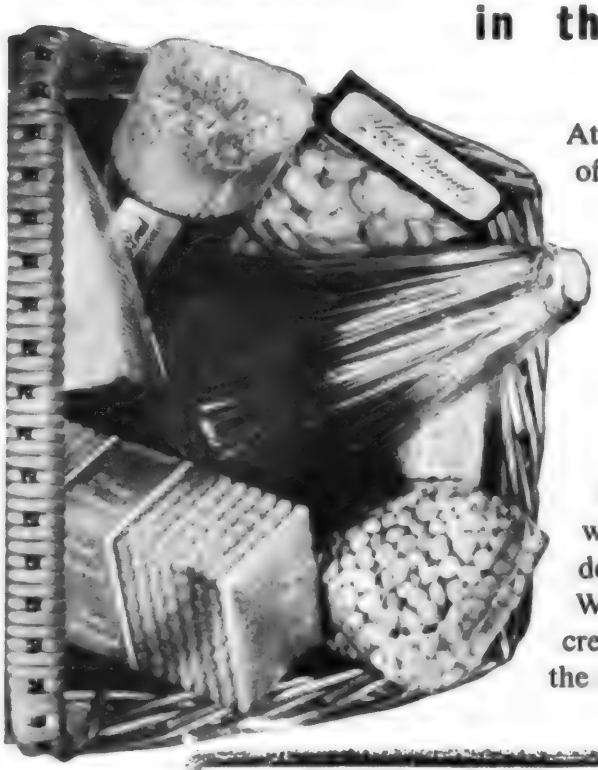

At the present rate of progress, the bulk of the Nation's foodstuffs will eventually reach the shopper's basket in pre-packaged form.

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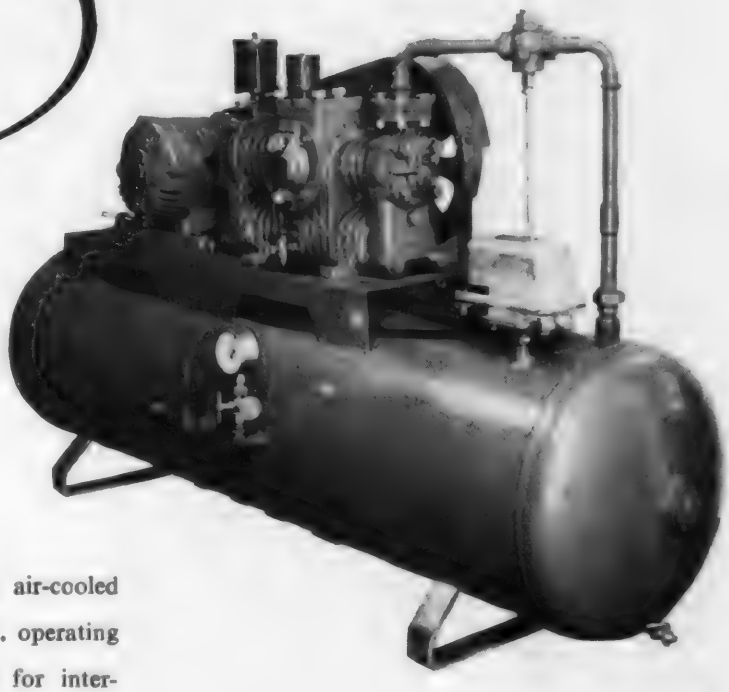

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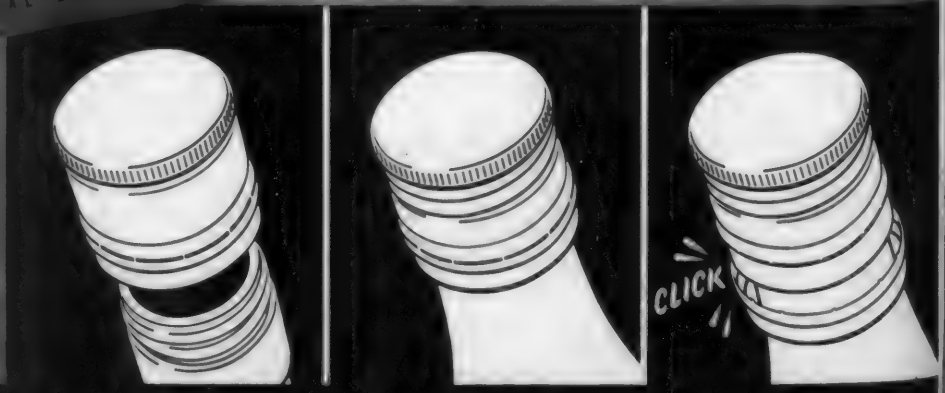

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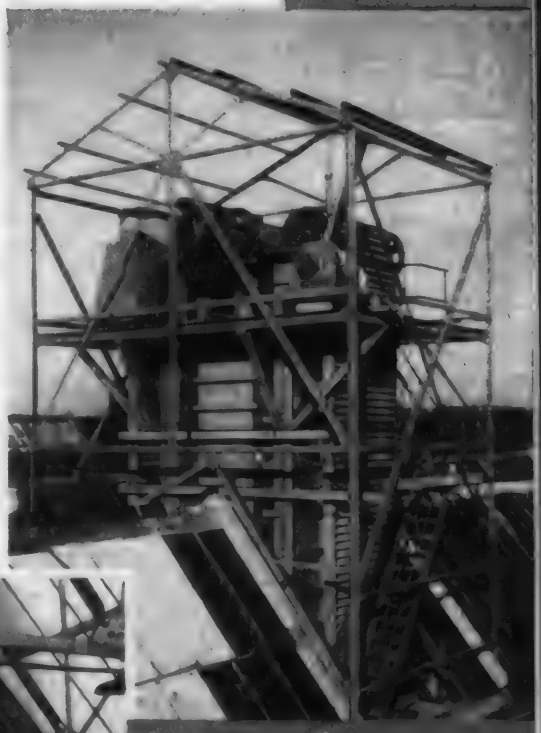

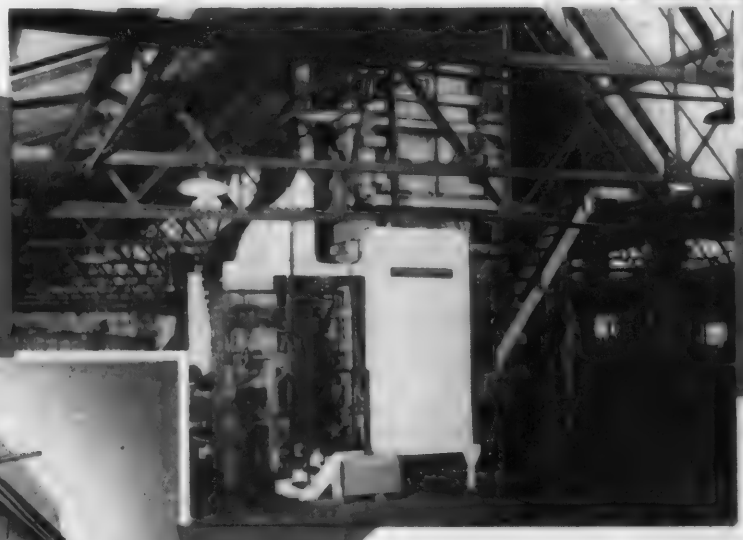

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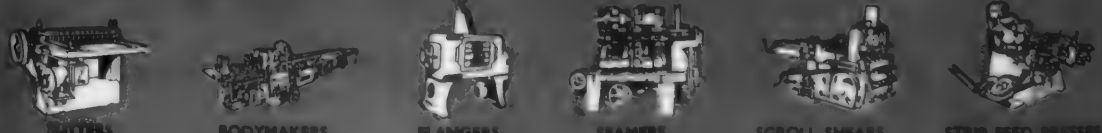

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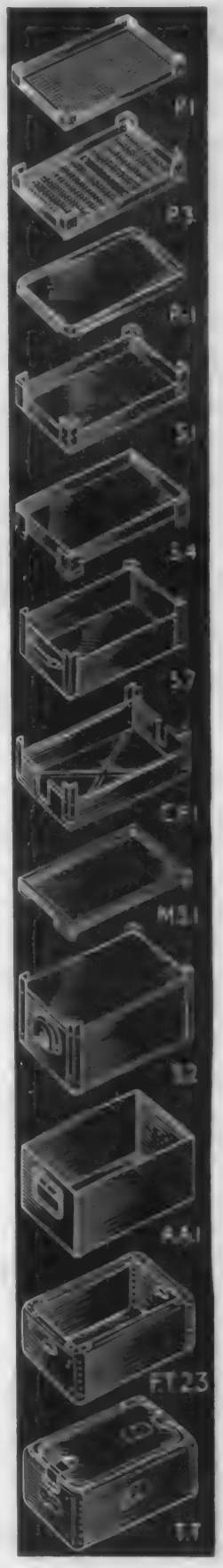

KEY: Reduced illustrations in the right hand column show a selection of types selected from the Phoenix range of interstacking aluminium industrial equipment, including S.1.; S.4; shallow working, sorting and storage trays, S.3; S.7; deep container trays with handles. M.S.1 Mogul starch tray. C.P.1 Chocolate Plaque tray. Pr.1 Seamless pressed tray. P.1; P.2; P.3; P.4; Perforated Cooling trays. S.2 Storage Box with lid. S.8 Lidded tray and/or storage box. A.A.1 Watertight argon-arc welded container with handles.

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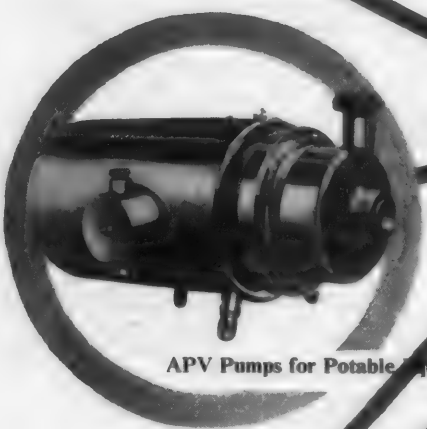

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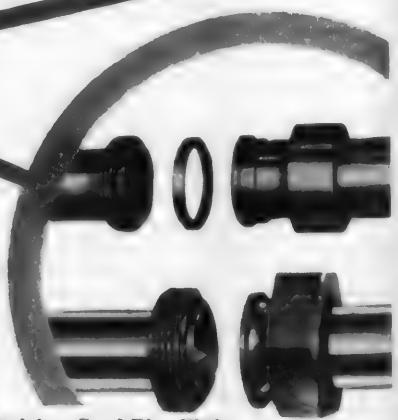

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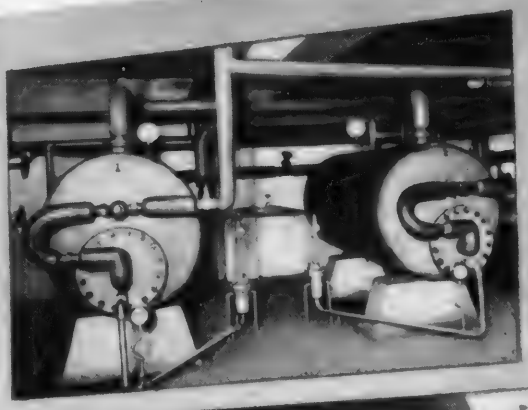
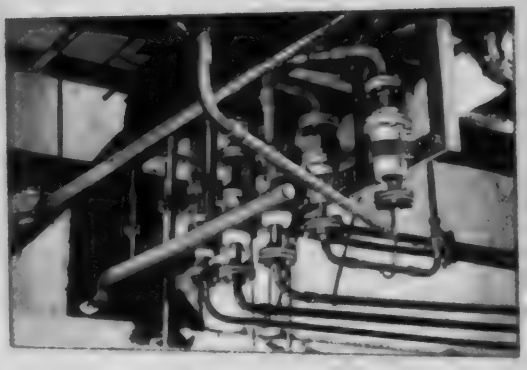


Drayton/Armstrong steam traps installed in a nurses' home in 1938. Inspected at regular intervals and no spares required.

Drayton/Armstrong steam trap draining Callopas dryer in large chemical works. Age unknown.



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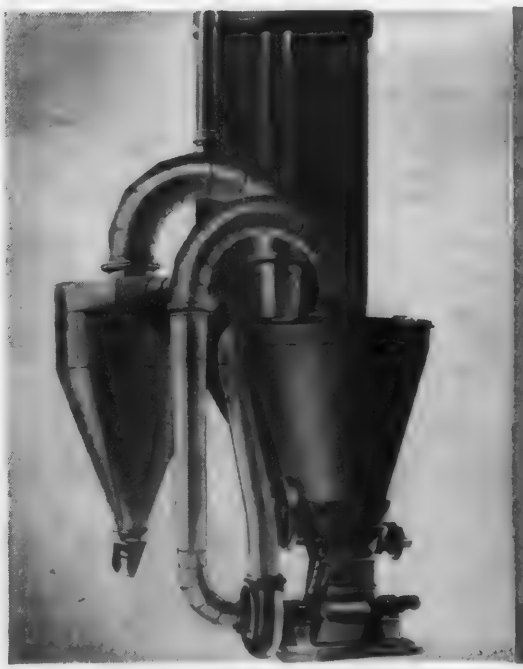

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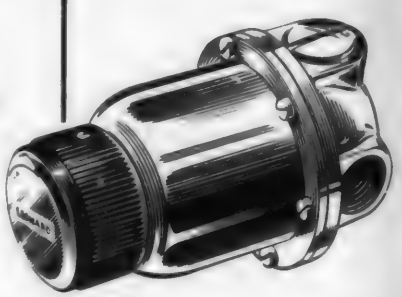
Our pamphlet No. F|9 will tell you all you want to know.



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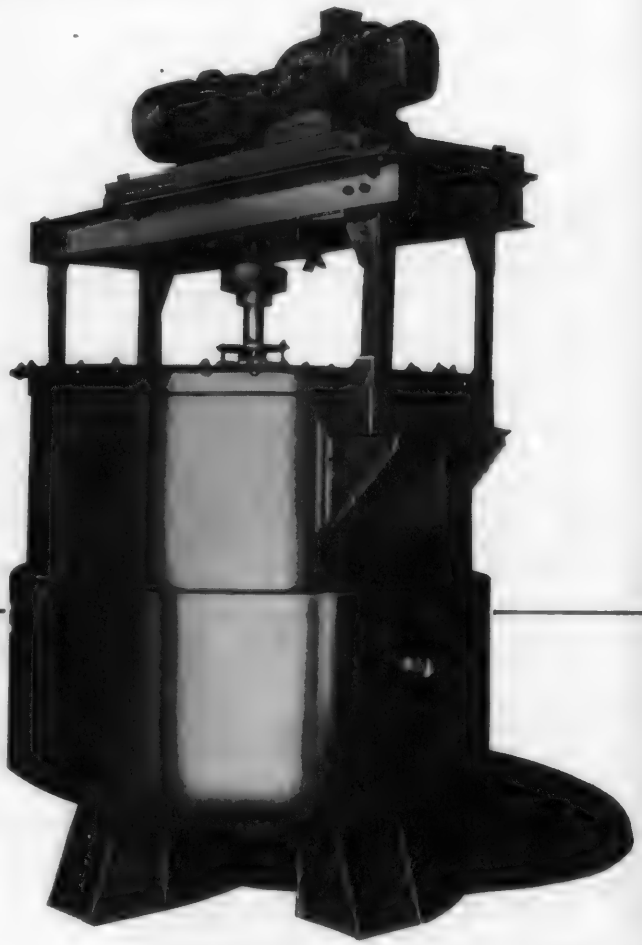

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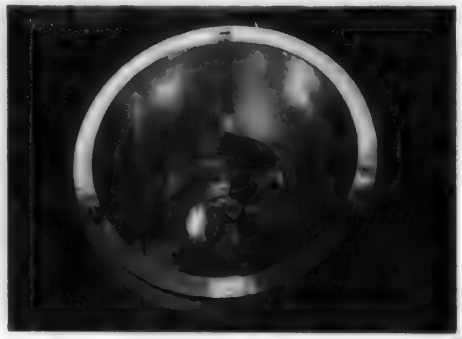

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specialists in the manufacture of grinding & blending plant and equipment

KM11

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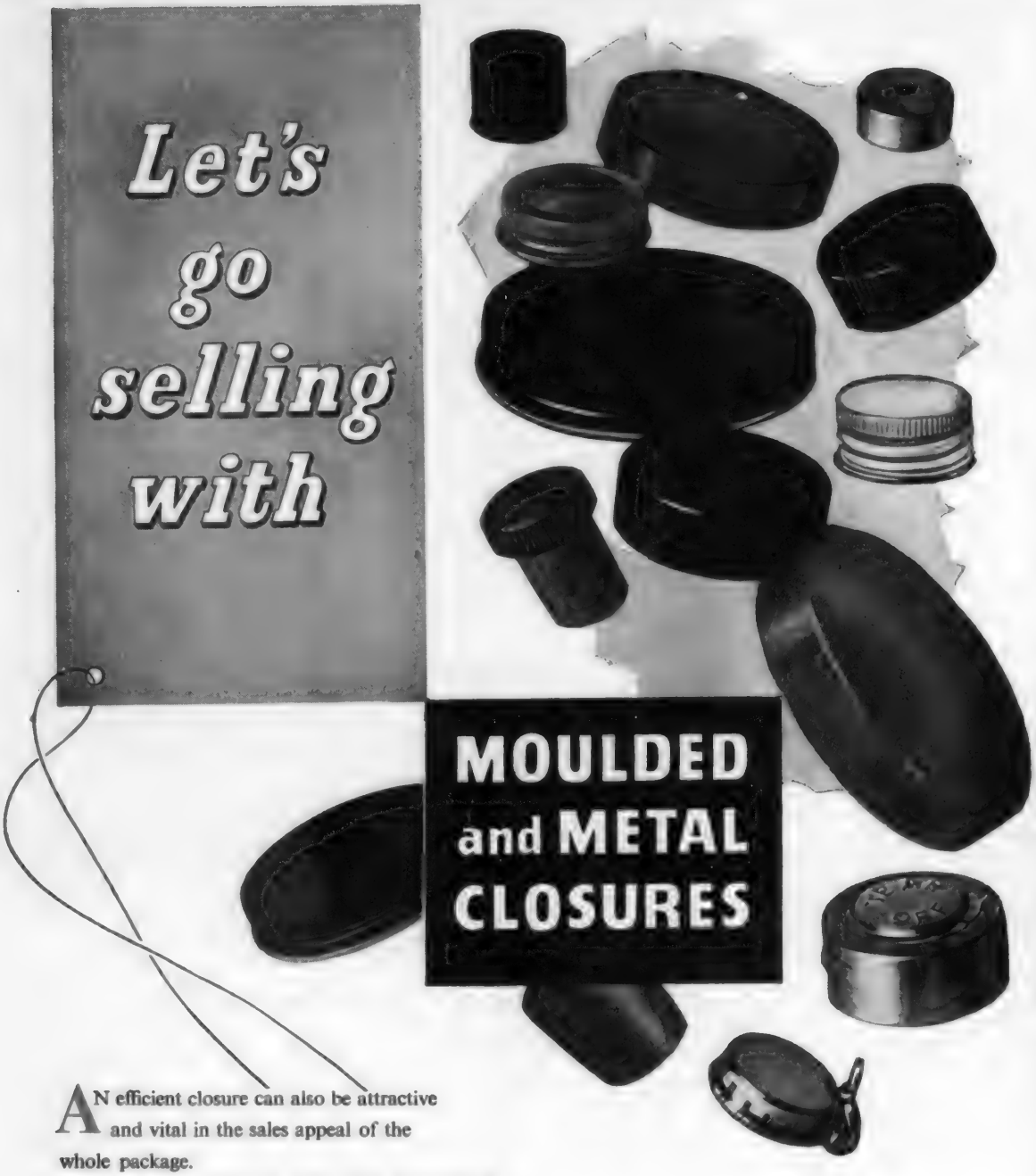

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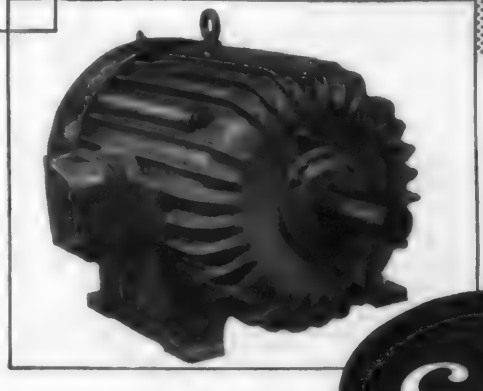

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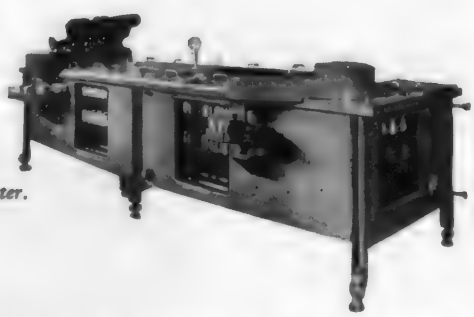

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There's nothing like daylight

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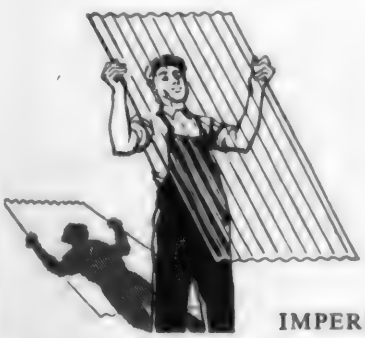
'Perspex' is the registered trade mark for acrylic sheet manufactured by I.C.I.



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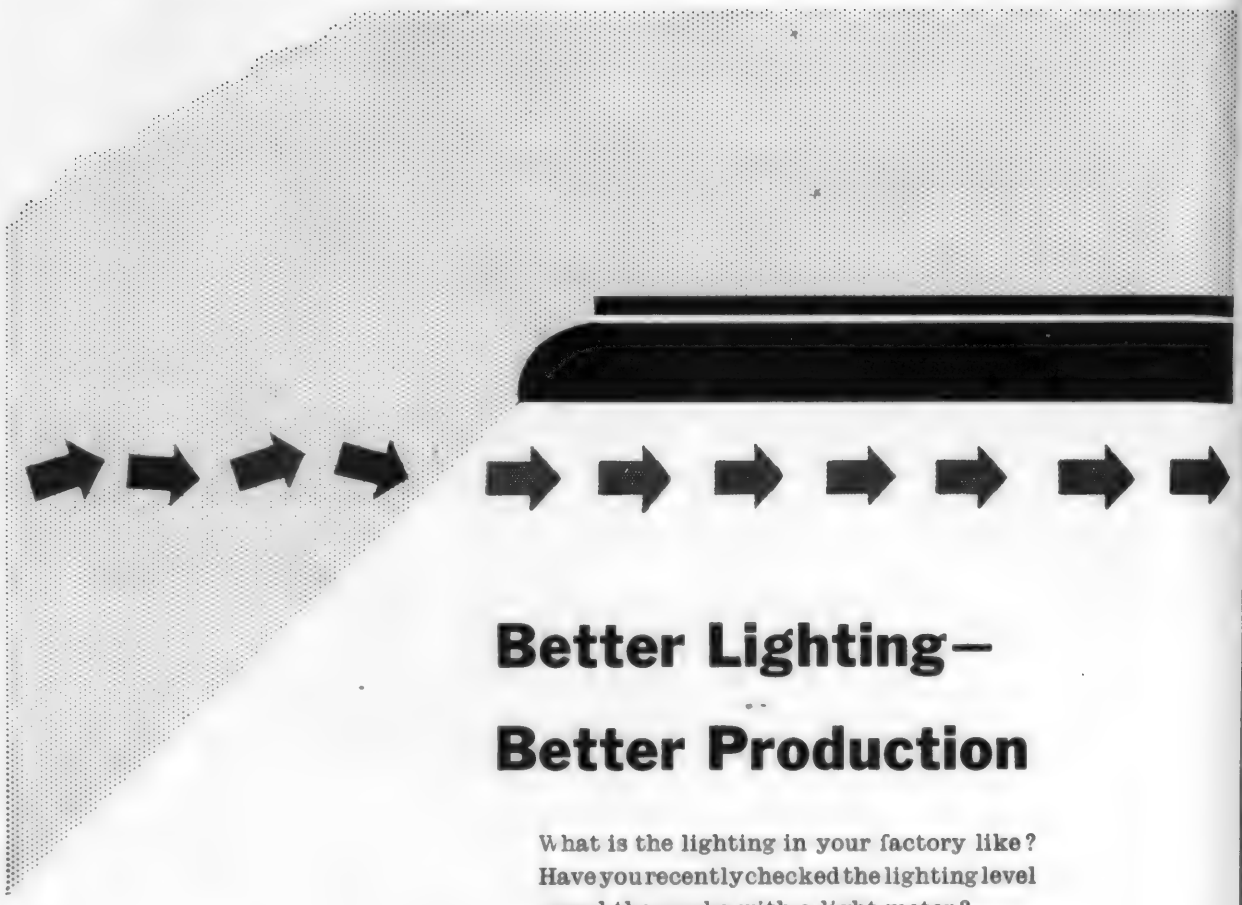

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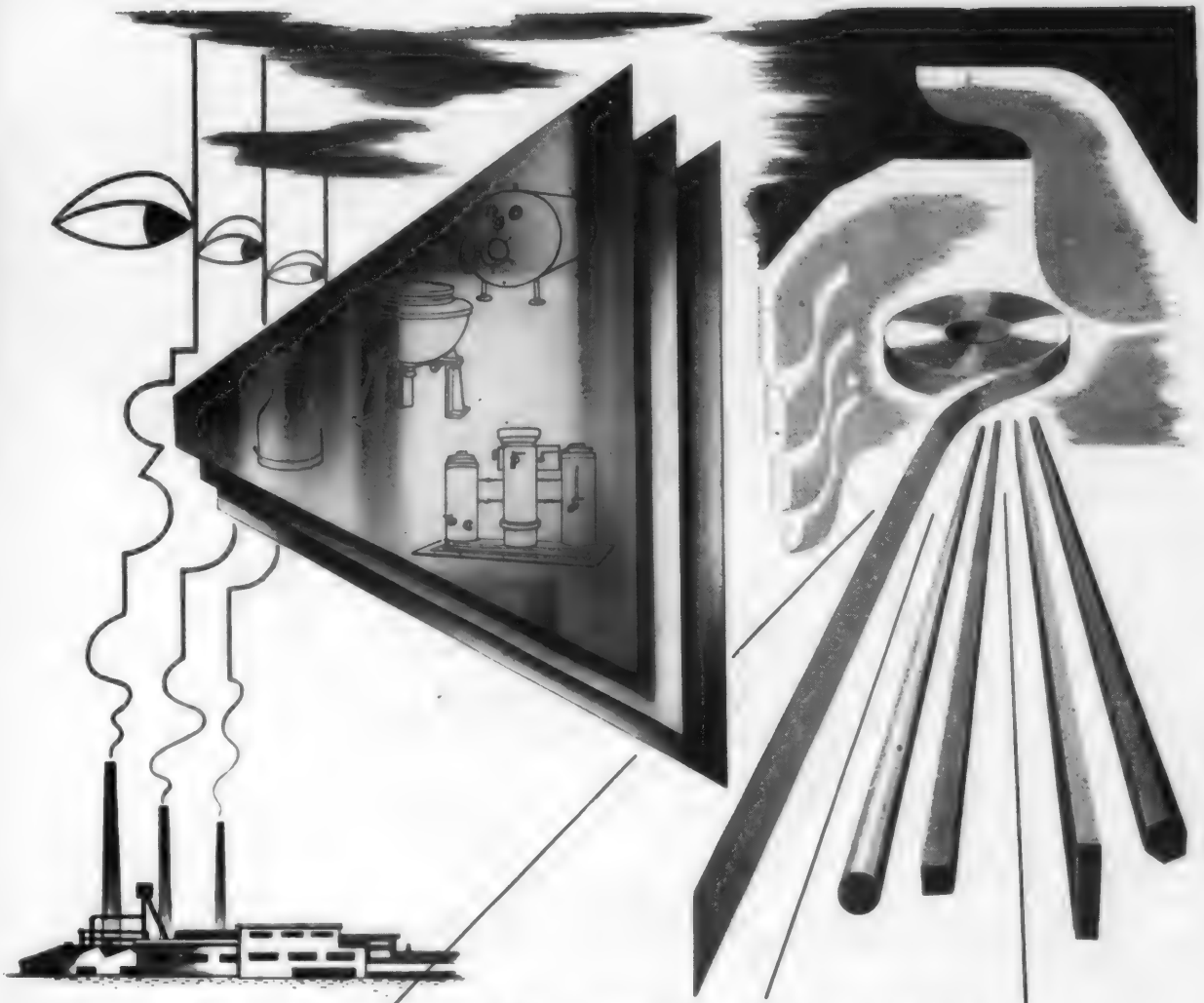

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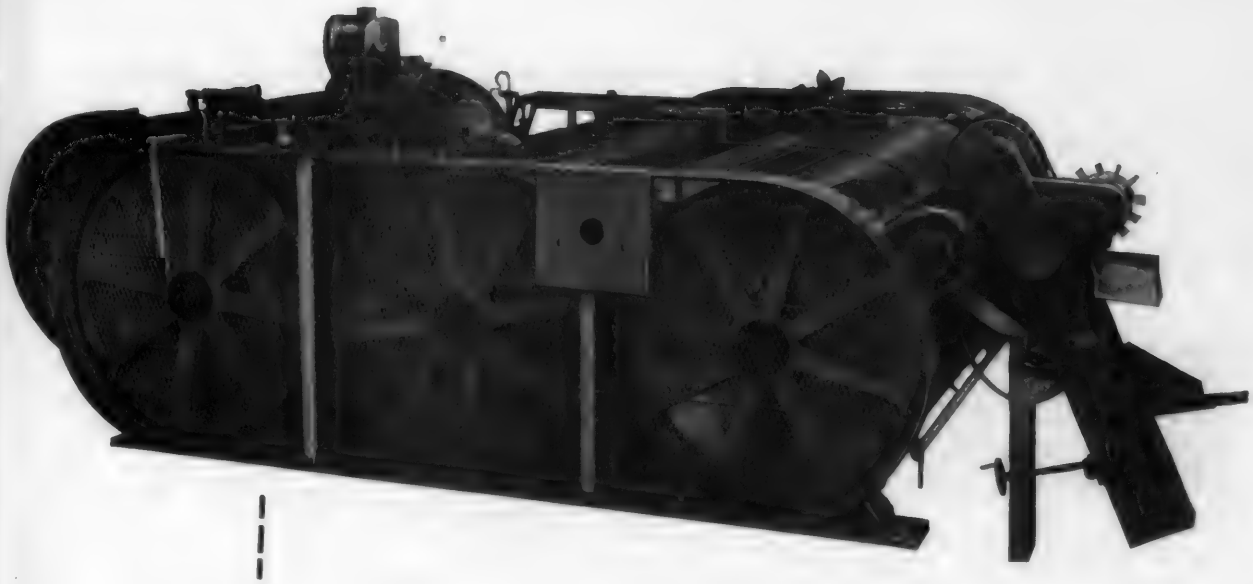

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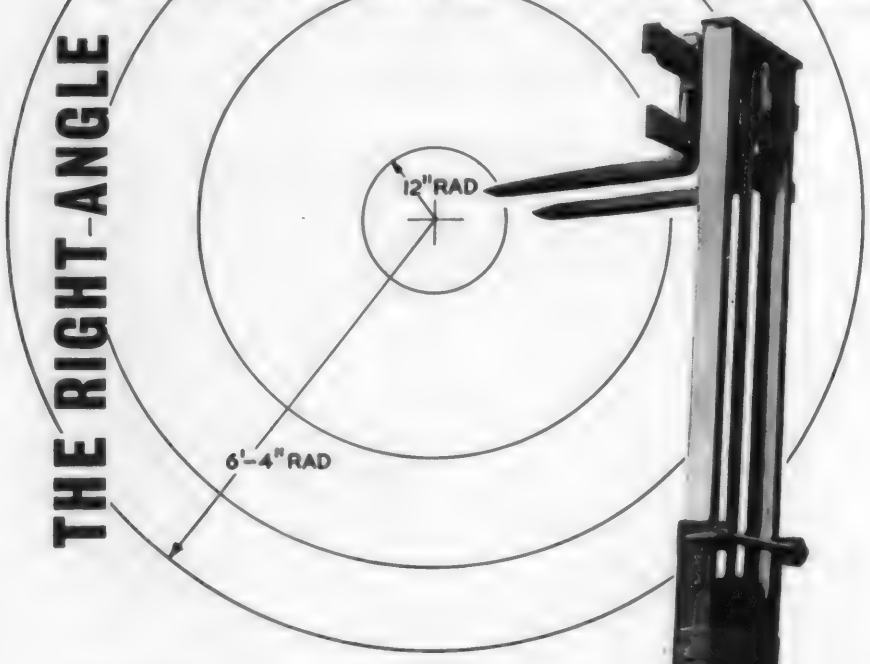

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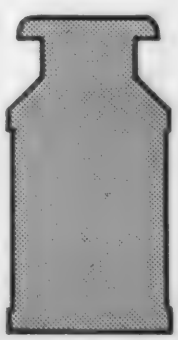

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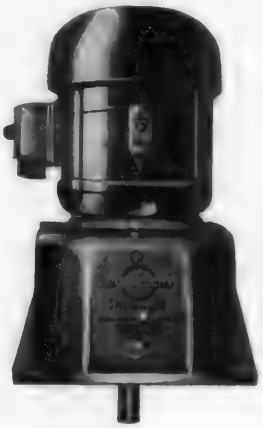

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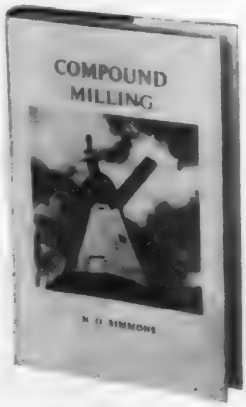

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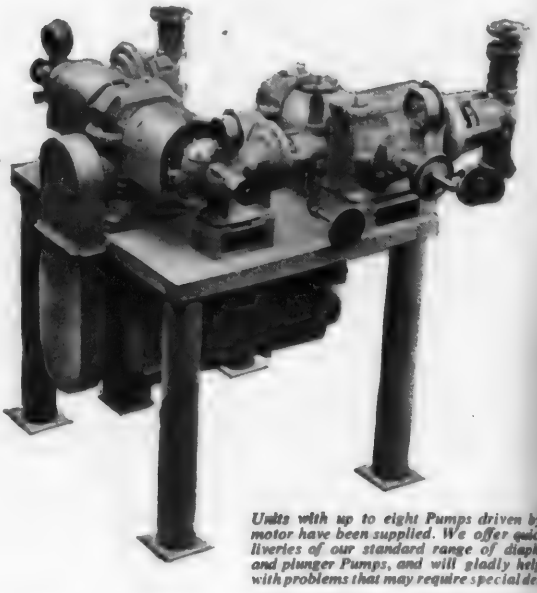

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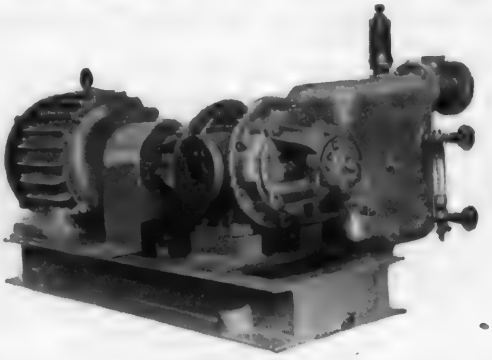

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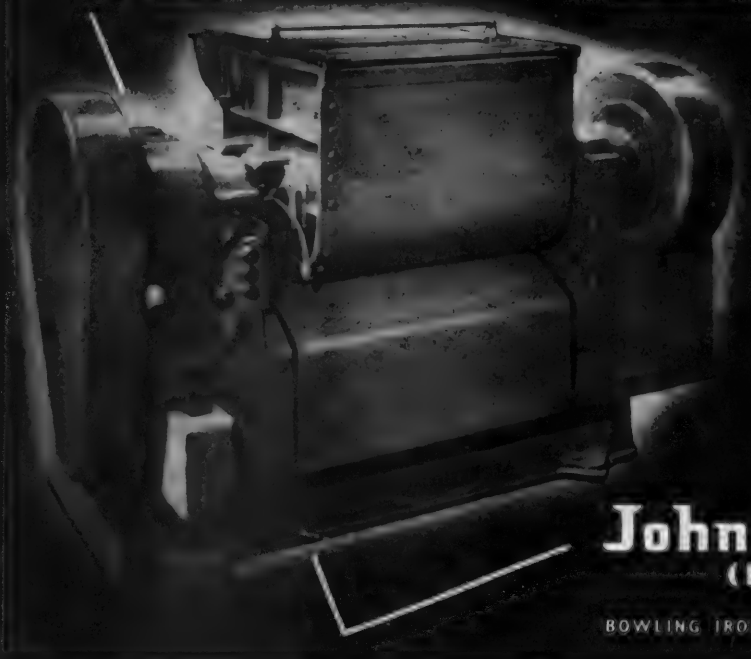

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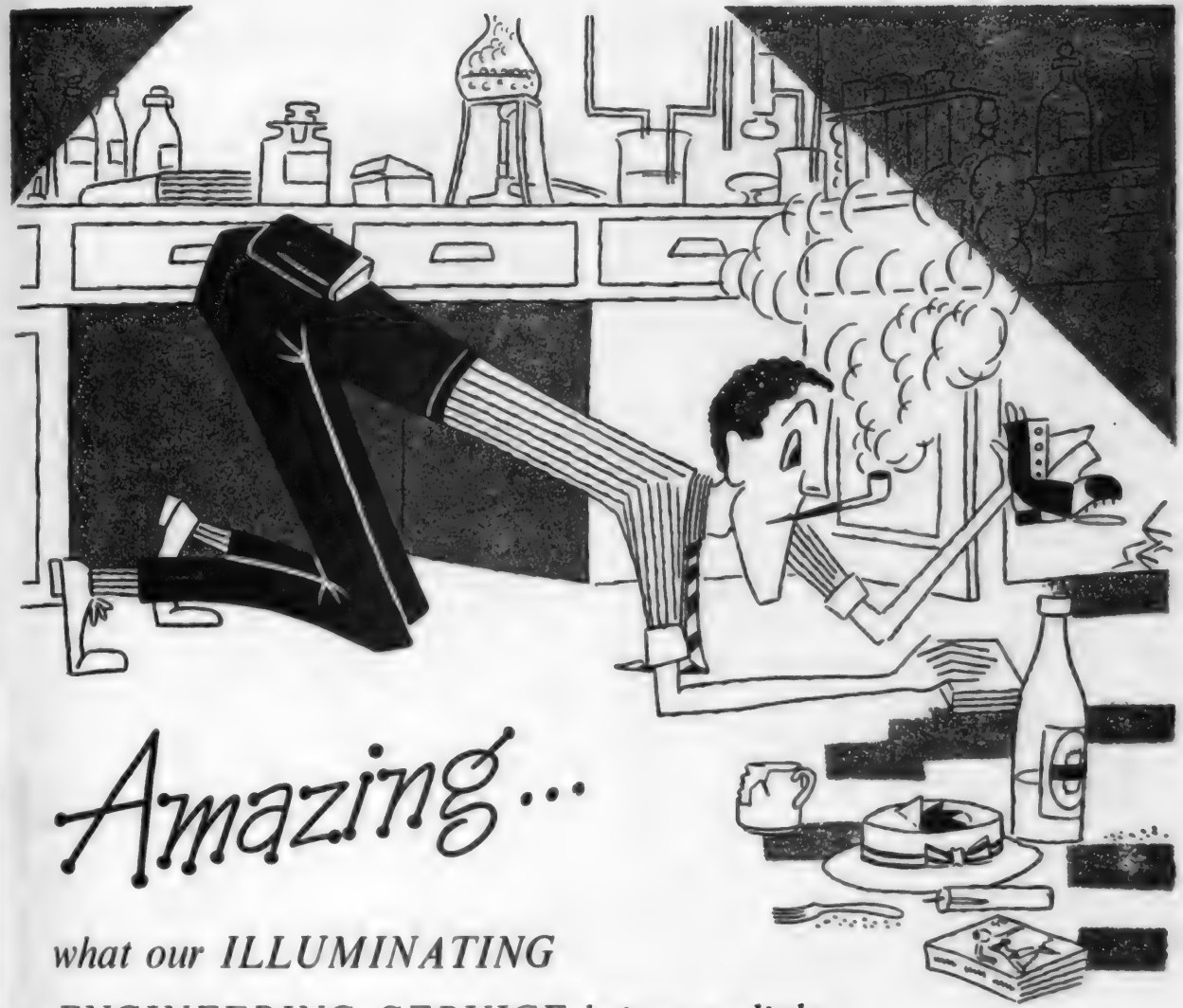

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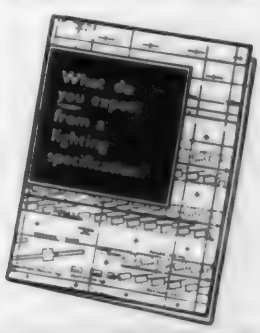

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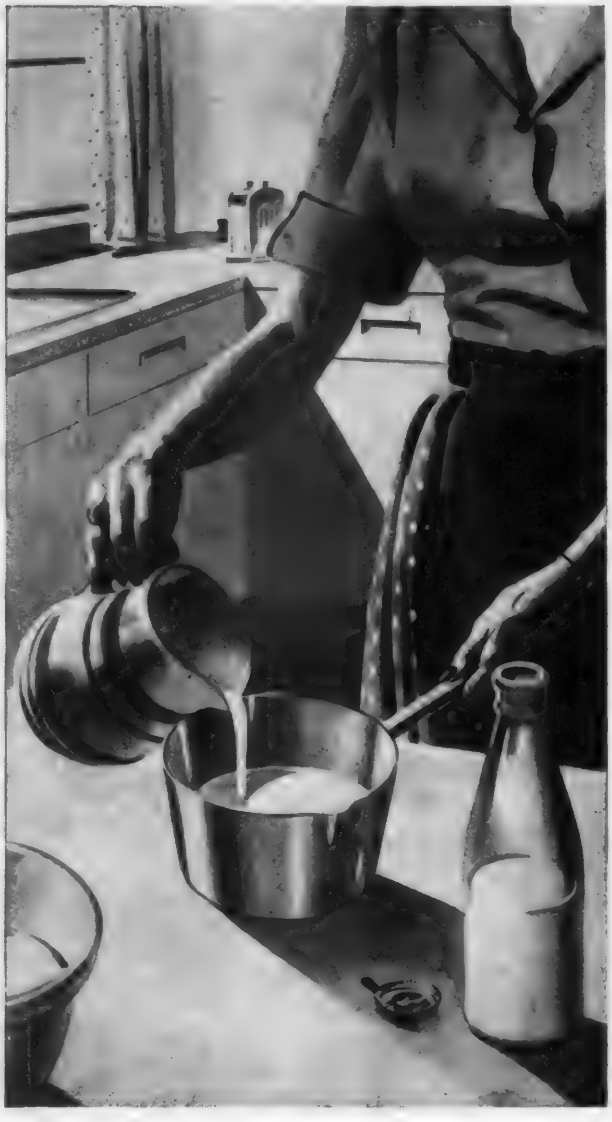

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29

FOOD MANUFACTURE

Vol. XXXI. No. 2 · Published Monthly · February 1, 1956

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FOOD MANUFACTURE

Vol. XXXI, No. 2 February 1, 1956

Cleaner food

A FLOW of food hygiene regulations came into force at the beginning of this year at the same time as the Food and Drugs Amendment Act, 1954 (the "Clean Food" Act), and the Consolidated Food and Drugs Act, 1955, under which they were made.

The new regulations apply to any place where food is handled or supplied in the course of a food business, whether there is an actual sale or not. They will apply, broadly speaking, throughout the food and catering trades and to the supply of food in clubs, schools, residential establishments, boarding houses, and staff canteens. Stalls and vehicles are also covered. The regulations will not apply to agricultural activities. The handling of food in dock warehouses, public warehouses or cold stores, carriers' and wholesale vegetable merchants' premises, canned food distribution depots and slaughterhouses will be dealt with in separate regulations.

Besides requiring cleanliness from food handlers, the new regulations also affect the structural condition of food premises, stalls, vehicles, etc., and the construction and cleanliness of articles and equipment with which food may come into contact. Carrying on a food business in unsanitary premises is forbidden, while the preparation and packing of food for commercial purposes in domestic premises is restricted. Sinks and wash-basins must be provided and, where necessary, a constant supply of hot water must be available. New works and adaptations to the structure of a food room will have to be carried out in such a way as to facilitate cleaning and, so far as is reasonably practicable, prevent infestation.

Equipment with which food may come into contact must be so constructed and maintained that it can be thoroughly cleaned.

Food handlers must keep all parts of their person or clothing (including overalls) as clean as may be reasonably practicable, and keep any open cut or abrasion covered with a suitable waterproof dressing. Smoking or the use of tobacco while handling unwrapped food is forbidden. Spitting too is prohibited.

There is a general requirement to protect food from the risk of contamination. In particular, it must not be placed anywhere that involves such risk. Food in forecourts, yards, markets or stalls must not be placed less than 18 in. from the ground unless it is adequately protected.

Under the new regulations the fish and chip supper wrapped in newspaper will soon become a memory. Newspaper is not to be used (except as an outer wrapper) for wrapping any food except raw vegetables.

Made-up dishes and pre-cooked foods which provide a good medium for the transmission of disease organisms must not be kept at the lukewarm temperature at which bacterial multiplication is greatest.

How the new regulations will work is a matter for speculation. They are to be enforced by local authorities, and the firmness with which this is done is bound to vary. The government has also provided a six months period (until July 1, 1956) for alterations to premises and equipment. Local authorities are authorised to grant certificates of exemption in cases where compliance cannot reasonably be required because of restricted accommodation or other special circumstances. To a large extent the success of the new regulations will depend upon the care exercised in granting these exemptions.

Canned fruit—a new record

CANNED FRUIT production in all Commonwealth countries except Malaya reached record levels in 1954, and with a near record pack in the U.S. world output was slightly over 2¼ million tons, more than 200,000 tons higher than in 1953. The Commonwealth Economic Committee's annual review, *Fruit* (H.M.S.O., 5s. net), shows that world exports of both canned and fresh fruits were the largest ever recorded. Malaya's pineapple industry, which was virtually destroyed during the war, is still relatively small, but other Commonwealth countries have considerably increased their production of canned fruit. In Britain, Australia and Canada, output was about three times greater than before the war, and South Africa's increased nine-fold. Imports of canned fruit into Britain—for some years the world's leading importer—during the last year in which they

were controlled, were some 80% greater than in 1953 and nearly as heavy as in 1938.

During and just after the war the British canned fruit pack consisted mainly of plums, apples and rhubarb, but recently these have become less important, and berries, currants, cherries and other varieties have come to the fore. Fresh fruit utilisation figures show that most of the "other" canned fruit produced in 1953 and 1954 consisted of pears, apricots and peaches which had been imported as fresh fruit.

British imports of canned fruit showed a very marked increase in 1954, and the total of 217,000 tons (covering both fruit in syrup and fruit preserved without added sugar) was about the same as in 1938 and more than double that of 1952. The trade in bottled fruit is relatively small, though recently fair quantities have been bought from Western Europe. Substantial imports were received of fruit pulp in hermetically sealed containers, particularly apricot pulp from Spain.

Although this country's imports of fresh fruits have been smaller in recent years than before the war, the total U.K. supplies have not been greatly reduced on account of the increased quantities of home-grown fruits now available. However, the average consumption of fresh and processed fruit is still a lot less here than in the U.S.A., Canada or Australia.

World wine production, estimated at 4,600 million gal., was smaller than in 1953, but exports were increased by larger consignments from Algeria and Spain. Britain bought more than 12 million gal., the highest figure recorded since the war. South African shipments were nearly as high as in 1951, but exports from Australia remained comparatively small.

Battle for the breakfast table

CONTENT with coffee and rolls for breakfast, Continentals have regarded with mixed feelings the British habit of consuming a multi-course meal each morning. Porridge has always been regarded as the traditional beginning to the British breakfast, but it is common knowledge that ready prepared cereals —principally corn flakes—have been equally if not more popular. Figures recently published in the *Financial Times* show that both products seem to be on more or less equal terms. The production of oatmeal and oatmeal flakes for the year ending August 1955 was 93,200 tons, while that of other breakfast cereals reached the record total of 94,500 tons. Until now the production figures for oatmeal and flakes have been consistently higher than that of their rivals.

Many households buy both cereals and porridge oats. A recent survey revealed that 71% of the housewives interviewed bought cereals and 57% porridge oats; in Scotland this last figure was 67%.

A recent venture which has so far been as successful in Britain as in the U.S., where it originated, is sugared corn flakes. Kellogg's "Sugar-frosted" flakes and Quaker's "Sugar Puffs" have both sold well, and now Kellogg's have introduced "Sugar Ricicles." In the year to September last nearly £200,000 was spent on press advertising for these products, nearly one-seventh of the total for all breakfast foods. However, the sales of one large chain of retail grocers seem to show a slight decline in demand for sugar-coated cereals as compared with last year and it is still too soon to say whether or not they will have any substantial importance in the total market.

Girls and gimmicks

AUSTRALIAN food products should pour into this country if the £250,000 a year programme of trade publicity announced from Canberra proves successful. The object is to increase the sales of butter, cheese, eggs, wine, dried fruits, apples, pears, canned fruits and canned meat, now arriving at the rate of £100 million a year.

During the first year the campaign will be concentrated on a systematic area-by-area coverage of nine main centres in which Australian products are distributed in Britain. An Australian publicity representative will co-ordinate merchandising and distribution activities of local wholesalers and retailers with specific Australian promotional campaigns in each of these areas. In addition, publicity staff will move from area to area, arranging special features, such as window displays, "Australian Weeks," cookery demonstrations and trade exhibitions.

We have already seen some examples of Australian food publicity methods. At the last Ideal Home Exhibition the Australian stand—staffed with attractive girls—gave away 150,000 samples and made 147,000 sales, including canned foods, dried fruits and honey. Later the team of publicity experts, trade officials and photogenic girls made a much-publicised sales reconnaissance of Bristol. Once again the experiment was successful, and soon shoppers at other stores in the country were buying Australian goods to the strains of "Waltzing Matilda" sung by Peter Dawson. Then a sumptuous Australian "egg breakfast" was held in London at the Grocers' Hall.

For a government-sponsored campaign the publicity is unorthodox, but it is undoubtedly getting results. Can we not learn something from the Australians?

Safer dough machines

MORE THAN half of the unsafe machines mentioned by the Chief Inspector of Factories in his recent report were used in four important industries, among them dough and confectionery. Machine parts which are in such a position as to be as safe as they would be if securely fenced need not be guarded, but, says the report, machinery manufacturers are apt to interpret this relaxation more widely than the circumstances warrant.

The conveyor method of feeding dough to dividers is not as popular as was expected mainly because a pressure board is necessary. When the lumps of dough which are placed on the conveyor are too large the dough is badly handled by the board so that starch, gluten, etc., are exuded with cumulative effect until the object of the board itself is defeated and the conveyor belt becomes so sticky that the dough does not readily drop off the end into the hopper. The difficulty only occurs when the conveyor is overloaded, and does not arise when the dough lump is kept to a reasonable size. An alternative to the extra dog clutch required to isolate the divider from the drive is being tried by one manufacturer. In this scheme a low horse-power auxiliary motor is coupled up to the existing drive through a chain and "freewheel" sprocket. When the main motor is shut down in order to open the interlocked divider guard, the auxiliary motor, which drives the prover only, is started up. An additional clutch is also necessary to disconnect the divider, and this has to be of the dog type to ensure correct coupling and preserve synchronisation in the plant as a whole.

The standard methods of protecting the feed rollers of dough moulding machines have not proved practicable in one or two makes in which the hoppers are fitted with adjustable internal partitions positioned according to the size of dough clot being fed at any particular time, the object being to ensure that the clot always passes into the rollers at their longitudinal centre. One machine has a nest of feed hoppers which fit into each other, thus varying the size of the actual feed opening. The difficulty of fencing these machines has been overcome by providing a rotary gate device with the addition of two circular discs capable of sliding along the gate axis. These are adjusted equidistant from the longitudinal centre of the rollers below, the space between the discs corresponding to the original positions of the hopper partitions which are now dispensed with. Graduation marks show the various positions of the discs to suit the dough for several sizes of loaf. The hopper as a whole can be swung clear for cleaning purposes, a suitable interlock being provided to prevent the rollers from being run under power when the guard is out of position.

A safety system for butter-blending machines provides a cover which allows the butter to be thrown in the trough but keeps the rotating "Z" arms out of reach of persons standing at floor level. Unless the cover is in position the arms cannot rotate. The arms are inched when the trough is tilted to discharge position by a system which does not allow them to build up any appreciable speed.

Butter-blending machines are among the large trough-type mixers which are generally unfenced. One such machine, used for mixing a very stiff and glutinous food product, is fitted with a photo-electric system. When a light ray is interrupted the motor stops, the residual momentum being reduced by an electro-mechanical brake and by a fluid coupling between the machine and the driving motor.

Progress in food analysis

THE RAPID progress of food technology has imposed on the department of the Government Chemist further demands for new methods for the detection and estimation of trace elements, vitamins, antioxidants, and residues from insecticides, etc., in food. In his recently published report for the year ending March 1955, the Government Chemist states that each division of the food, drugs, agriculture, forensic and water branch has had to face the need for almost continuous research into methods suitable for its own needs.

A method for the detection of lead in foodstuffs was worked out by the department to supplement the recently published method of the Society for Analytical Chemistry. It has been found that the alkaline earth phosphates, including magnesium phosphate, can be kept in solution, under conditions suitable for the dithizone extraction of lead by the addition of sodium hexametaphosphate. This facilitates the use of a simple dithizone purification step in the determination of lead traces in many foods in which, up to now, the presence of magnesium has given rise to difficulties when phosphates were also present.

A very sensitive and convenient dibenzyldithiocarbamic acid method has been used by the department for the determination of traces of copper in oils and fats, and they have been able to establish that some commercial samples of compound cooking fats have copper contents of less than one part in 50 million. This suggests possible reasons, other than their copper content, for differences in the rates of development of oxidative rancidity in these fat mixtures.

Since the publication of the Food Standards (Margarine) Order, 1954, the chromatographic method for the determination of vitamin A in margarine has been used for all routine samples. During the year a large number of margarine samples were examined in con-

nection with storage tests on the vitamin A content carried out by the British Food Manufacturing Industries' Research Association. The volume of work connected with the examination of fish liver oils, vitamin A and D tablets, and vitamin D concentrates continues to increase.

An investigation is in progress regarding the separation and determination of the isomers of carotene (derived from various sources, including palm oil) which may be added to margarine. It is hoped that the method will be satisfactory for determining the true equivalent vitamin A potency.

Jams for Germany

WESTERN GERMANY provides a promising market for British jams, according to a report by the Export Services Branch of the Board of Trade. German jams are relatively expensive, costing from about 1s. 5d. to 2s. 6d. per 450 grams without the jar. High import duties have raised the price of British jams, but the steady rise in prosperity is creating a useful market for better quality goods, including high quality jams and marmalades. British products have an excellent reputation and, although sales are at present restricted by quota limitations and the 35% import duty, prospects are by no means discouraging. In the first half of 1955, for instance, 162 tons of British jams worth 192,000 Deutsche marks were imported into Germany.

Although there are about 100 firms manufacturing jam and other fruit preserves in Germany, only about 35 of them can claim to be well known, and the market for first-class products is dominated by an even smaller number. Production rose from 66,000 tons in 1952 to 77,000 tons in 1954.

The German word *marmelade* does not apply only to preserves made of oranges or citrus fruits. The terms *Konfituere* and *Marmelade* are used to define differences in quality only. Only full fruit jams may be described as *Konfituere*, while *Marmelade* includes all second-quality jams which are usually prepared from fruit paste, surpluses from canned fruit and from *Konfituere* production.

The most popular jams are strawberry, apricot and cherry, but raspberry, blackcurrant and pineapple jams, and orange marmalade, also sell well. Fruit jellies have a smaller sale, and as far as is known only blackcurrant jelly is imported.

Because of their high price, British jams have to sell almost entirely on the basis of quality, but they have enjoyed an excellent reputation for many years with well-to-do purchasers. It is probably in the wealthy industrial towns of North-Rhine/Westphalia, the prosperous port of Hamburg and in West Berlin that efforts to sell more British jams will be most successful.

Versatile M.S.G.

USED first by food manufacturers in soups, monosodium glutamate is rapidly becoming a standard seasoning ingredient in many prepared foods. Nearly a half century ago the Orientals discovered its value for enhancing the flavours of many of their foods and now it has become almost indispensable in Oriental cookery.

Gradually food processors have learned of the value of monosodium glutamate in bringing out subtle flavours in canned foods. Today it is used in such canned foods as clam chowder, black bean soup, split pea soup, chicken noodle soup, canned mushroom products and most prepared meat products. It is also important as an ingredient in dehydrated vegetable products such as dehydrated onion soup, cream of mushroom soup, potato soup and other similar products. However, it is of little value in sweet or sour products. The amount to be used varies with the particular food product and its formulation. In general, however, it varies between 0·1% and 0·3%, with very few products requiring less than 0·1% and only a few requiring up to 0·5%. This optimum range represents from about 1·5 oz. to 5 oz. of pure monosodium glutamate per 100 lb. of finished product. It is always best to determine the proper amount for a particular formula by trying out several amounts in the approximate range and selecting the amount most suitable for that particular product.

It might appear unusual for a product to have such wide applicability. Consider, however, the wide use of salt in foodstuffs. Salt has been used for centuries to season foods and bring out their natural flavours. Monosodium glutamate complements salt in enhancing still further the natural flavours of canned and prepared foods. It never replaces salt in a formula but rather fills a spot of its own in the seasoning picture.

Originally commercial monosodium glutamate preparations contained varying amounts of the constituents of the hydrolysate as an impurity and the product was mistakenly described as possessing a "meat-like flavour." Modern chemical engineering techniques have provided a means of producing commercially a highly purified product which is substantially free from the hydrolysate impurities and, therefore, free from flavour. As the use of monosodium glutamate extends to new products it is realised more and more that the higher the purity the more versatile and effective it becomes.

Recently a new brand of monosodium glutamate has become available in this country. It is *Ac'cent*, made by a subsidiary of International Minerals and Chemical Corporation, U.S.A., and imported into the U.K. by Getz Bros. and Co., London.

Vinegar Manufacture

PROCESSES, PLANTS AND PROBLEMS

By H. P. Mollenhauer

Although a basically simple mechanism is involved in vinegar manufacture, many problems arise in practice. As a result, vinegar manufacture has become one of the most highly developed branches of food technology. In this practical article the author discusses processes, plants and problems, including vinegar diseases.

VINEGAR MANUFACTURE is based upon the consecutive alcoholic and acetic fermentations of a suitable medium, usually grape juice. Any sweet fruit will naturally turn into some form of vinegar, the alcoholic fermentation resulting from the activities of yeast, the acetic from those of bacteria.[1, 2] Basically wine and vinegar are made by the same process of acetifying an alcoholic liquid by exposure to air[3]. The process is still used in some parts of the world for making wine and vinegar[4] (usually with little distinction between the two) but, generally speaking, this simple method has evolved into one of the most highly developed branches of food technology.

Raw materials

Vinegar can be made from any edible substance containing sugar, starch or alcohol, and suggested raw materials have included oranges, potatoes, peaches, dates, pineapples, molasses and Bichu (a Formosan alcoholic beverage).[5, 6, 7]

However, only four materials have any commercial importance: grapes for wine vinegar, malt for malt vinegar, apples for cider vinegar and alcohol for spirit or distilled white vinegar.

Strictly speaking, we should only use the word "vinegar" for wine (vin) vinegar. Boorde, in his "First Boke of Introduction to Knowledge" published in 1542, suggested the word "alegar" for malt vinegar.

Orleans process

The natural souring of wine is a very slow process, and for several hundred years alchemists and chemists tried with little success to hasten acetification. In the first half of the seventeenth century J. J. Becker found that air was necessary to the process, but it was not until 1837 that Kuetzing discovered that the changes caused during acetification were due to the activities of some living unicellular germs. However, the theories of such distinguished scientists as Liebig, Doebereiner and Berzelius, who held that the process was a mere chemical reaction, held sway until Pasteur, in 1864, proved experimentally that the acid (acetic acid) was produced by what he called *mycoderma aceti* living on air, alcohol and some minor nutrients.[2, 8, 9]

Pilot plants for vinegar manufacture.
Left: **A generator with shavings capable of converting 15 litres of absolute alcohol per 24 hr.**
Right: **"Acetator" submerged fermentation generator capable of transforming 150-180 litres of absolute alcohol per 24 hr.**
Both vats are of 5,000 litres capacity.

In order to encourage the growth of the living cells, Pasteur suggested enlarging the surface of the liquid and the provision of some mechanical support to the film of bacteria. This method of making vinegar is known as the Orleans or Pasteur method. Wooden casks are partly filled with a mixture of wine and vinegar. After several months, when the vinegar has acquired the desired acidity, some of it is drawn off for use and the cask re-filled with wine to its previous level.

Quick-vinegar process

The Orleans process is hazardous; it may take from 2 to 6 months and occasionally may fail completely because of infection with harmful types of bacteria which turn the acid into CO_2 and water. Based on the knowledge of his time, Schuetzenbach, in 1823, invented the "Quick-Vinegar" process. His plant consisted of a battery of upright wooden vats, each provided with a perforated false bottom and packed almost to the top with rough wood shavings. Holes were drilled in the cask below the false bottom to allow air to be drawn up through the shavings. On top of the vat an ingenious tipping trough dispensed a small quantity of alcoholic liquid at intervals over the wood shavings, which eventually permeated through the perforations in the false bottom. After some time the whole contents of the generator were soaked with the liquid spread over a very large surface exposed to air. In this type of generator the bacteria remained on the wood shavings while the liquid, whose acidity was raised by about 1 to 2%, was collected from under the false bottom and fed to the next generator. The acetic acid content of the liquid was raised each time it passed through a generator in the series.

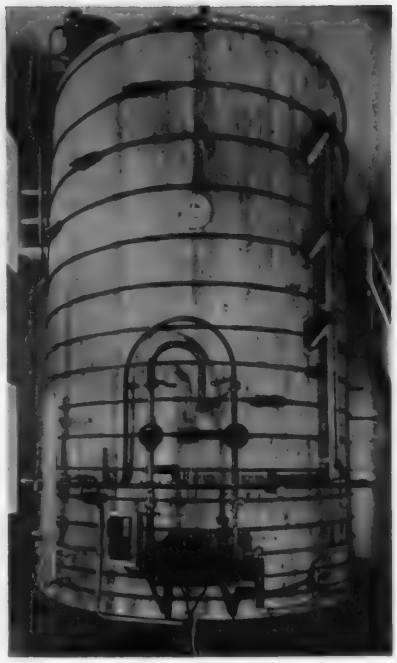
Schuetzenbach's invention was not entirely original. In the *Philosophical Transactions* of the Royal Society for 1670 there is a paper on "The way of making vinegar in France . . . by an ingenious Physician of that Nation"[10] which foreshadows a method for moving the liquid over some rough material for hastening acetification. This knowledge seems to have been lost later and this particular system was only rediscovered by Bruenner in 1941 and duly published.[11]

The standard of production achieved in the manufacture of this type of plant was very high, as every part in contact with the liquid had to be made from wood or glass. Schuetzenbach had no mechanical pumps, rubber hose, stainless steel or plastics to help him. Conditions for the bacteria were so much more favourable than in the Orleans plant that vinegar could be made not only from natural fermented alcoholic liquids such as wine or beer, but from mixtures of spirit and water with some additional minerals and nutrients. However, the system was still not foolproof, mainly because of the unpredictable behaviour of the bacteria. At times they would be violently active, drawing in large quantities of air and generating a continuously rising heat which eventually killed off most of the bacterial population and, at the other extreme, they would often lie dormant, generating no heat at all and preventing the weaker bacteria from living.

Modern automatic generators

The answer to these problems was, of course, tc control the life activities of the bacteria. Similar problems had occurred to wine makers who required a slow and controllable yeast activity. In their case the answer had been found to be pressure fermentation in closed vessels, with the means of slowing down fermentation by letting the pressure build up or accelerating fermentation by releasing pressure.

To achieve this control of the bacteria, it is necessary to control air supply and temperature. For a controlled air supply it is essential to ensure that the entire generator is airtight and that the air is supplied mechanically and in measurable quantities. Thermometers and some form of temperature regulation must be placed in the liquid to control the heat of the bacteria. Continuous recording of temperatures at different check points, the rise of acidity and the fall of the alcohol content of the liquid is essential.



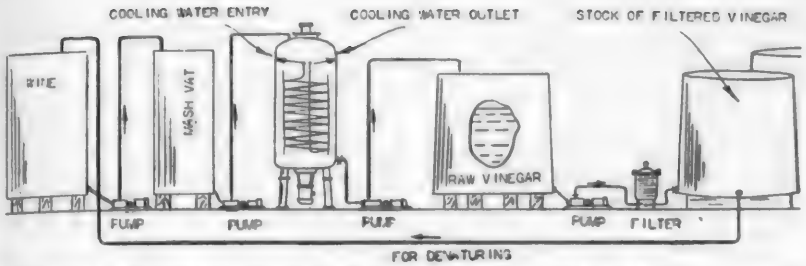
Smaller automatic vinegar generator with shavings, employing the Frings system. *Bottom centre* is the mash circulating pump with flanged ventilator. Above, arranged vertically, are the air and liquid measuring instruments. Horizontally around the vat are the cooler with control thermometers (*left*) and a cock for the mash supply to the pump (*right*). Above this cock are three illuminated thermometers for temperature control. On top of the vat (*left*) is the container for the distribution of the mash.

Obviously these refinements were impossible with the old Schuetzenbach plant. In a modern plant for vinegar production by semi-automatic generation which the author has operated for some time, a single unit replaces the battery of generators used by Schuetzenbach, the liquid being kept in circulation through one vat. The wooden tipping trough is replaced by a set of perforated plastic tubes, attached to a rotor resting on an agate bearing, which spray the liquid evenly over the top of the wood shavings. A stainless steel pump and a plastic piping system keep the liquid circulating from the collector underneath the false bottom to the top of the plant. The whole generator is completely sealed and air-tight except for a narrow plastic chimney which may also be closed. Air is circulated through a pump unit consisting of the pump proper and an air fan running on the same shaft. The air is blown into the generator near the false bottom, rises through the filling material against the downward flow of the liquid and leaves the plant through the plastic chimney.

The quantity of air and liquid per unit time running into the generator can be independently controlled by hand valves or by automatic means. On its upward path the liquid passes a double jacketed water cooler arranged as a spiral pipe system around the lower part of the plant. Three thermometers with their shafts reaching well into the centre of the filling material are placed at the lower, middle and upper zones of the active area of the generator. A further thermometer is situated on the top of the unit to check the temperature of the liquid flowing into the sprinkler. This particular thermometer electrically operates the water cooler, automatically preventing the plant from becoming overheated. Finally, more thermometers check outgoing and incoming water and vinegar at the ends of the cooler, which helps, among other things, to economise on cooling water. For further detailed descriptions of the plant see publications elsewhere.[12, 13, 14]

Starting up a new plant

A quantity of active, non-filtered, untreated vinegar with a residual alcohol content of about 1% is required to start up a new plant. This can easily be produced with the Orleans method. Beech wood shavings are normally used to fill generators in Europe and can be specially purchased for this purpose. However, many



Flowsheet of vinegar production by submerged fermentation using the "Acetator."

other filling materials, including coke, have been suggested for use in warmer countries where beech is not available. The author has found corn cobs (*Zea mays*) very useful. They are easy to handle, long-lasting and seem to be more effective than wood shavings as they have a larger surface area (though this, of course, makes them more liable to clogging).

After filling, the unit is completely closed and sealed. The starter vinegar is introduced into the cooler pipe system and from there picked up by the circulation pump. To facilitate this stage of production warm water is circulated through the water jacket of the cooler, and here the thermometers on the cooler must be watched as careless warming up may pasteurise the vinegar! After a while the first drips of vinegar will begin to collect under the false bottom. Usually the makers of the plant give instructions on the exact quantity of vinegar to be introduced into the plant, guided by the rough rule that 1 cu. ft. of filled space will hold about 2 gal. of liquid. After the necessary amount of starter vinegar has been put in, the normal flow circuit from collecting chamber through circulation pump up to sprinkler is closed. When using corn cobs as the filling material it will be noted that most of this vinegar will gradually disappear as it is being taken up by the cobs, which are rather slow in absorbing liquid compared to wood shavings. This process may last up to three days. However, before this the generator will have started production, which is almost instantaneous. During the initial pre-production period the liquid is circulated rather slowly, and the air supply shut off completely, as there is plenty of air in the dry generator. At all times a close watch must be kept on the temperatures. At first the warm vinegar will cool down during its passage over the filling material and in some cases it may be necessary to circulate more warm water through the cooler. Eventually, however, one of the thermometers will record a slight increase in temperature inside the generator: the bacteria have become active and the plant has come to life.

From now on the operator must control the life of the bacteria. The temperatures are recorded and plotted about every two hours. The first zone to operate will keep warming up the vinegar until the whole filled space is active.

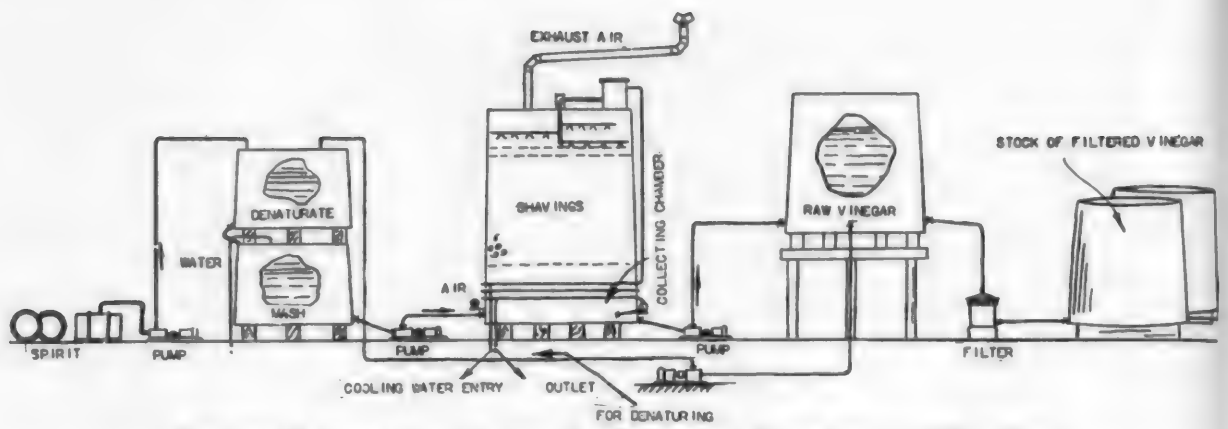
At this stage, air is blown in. From now on the air supply will come from below, and therefore the lowest zone will always show the highest activity, acting as a heat reserve for the vinegar while it is circulating to the top of the generator. A certain latitude of temperature is suggested for each individual zone and the operator's aim is to run his plant as closely as possible to the optimum temperature, which is about 82° to 86°F. for the upper zone, 86° to 91°F. for the middle zone, and 91° to 95°F. for the lower zone. During the running-in period these temperatures are lowered by increasing the flow of liquid spray over the filling material and raised by increasing the air supply. Temperature control can thus be achieved.

Raising the temperatures to the optima raises the output of the plant as expressed in the quantity of pure alcohol being oxidised to pure acetic acid per unit time until the maximum production is reached. This is governed by the space provided for the filling material. With an efficient plant of the type described, one can roughly estimate a production of 4 gal. of pure spirit converted into 4 gal. of pure acetic acid per 100 cu. ft. of filling material per 24 hr., or in other words a production of about 80 gal. of 5% vinegar per 100 cu. ft. per day. If it is not desirable to run the plant at top speed the air supply can be reduced. The temperatures are then thermostatically controlled.

With this type of generator, any alcoholic wash may be used for making vinegar with an alcohol content from as low as 6% to about 12% by volume, which is close to the maximum acidity that the bacteria can produce. One per cent. alcohol will yield about 1% acid.

Operating routine

The further operation of the generator is quite simple. As soon as the starter-vinegar has worked down to about 0·5%, enough new wash is introduced to bring the final alcohol content of the total liquid now circulating to about 4%. This is repeated until the generator has been filled to capacity. From now on the alcohol is oxidised down to 0·3%, when the whole contents of the now finished vinegar are taken out and replaced by a new wash. For this to be done effectively, the alcohol and acid contents must be estimated and recorded at least once daily so that the operator can forecast the time when the required alcohol and acid content will be reached. During the initial period the operator should try and improve his skill by carrying out a few experiments. For example, he should find the reactions of the plant to variations in the air supply by cutting it down to a minimum and then increasing it gradually as much as possible. This will supply two sets of records: the correlation between air supply and bacterial activity as expressed in quantity of alcohol oxidised per unit time (*e.g.* gal. per 24 hr.) and the correlation between air supply and yield, found by adding together



Flowsheet of vinegar production employing the automatic Frings generator with shavings.

the quantities of alcohol and acid. The latter sum should remain constant if no alcohol is lost through excessive air supply.

As a general rule about 650 cu. ft. of air will be needed to oxidise 1 gal. of pure alcohol. This is, of course, in excess of the requirements according to the chemical equation and depends largely on the type of plant.

A similar experiment should be carried out by altering the quantity of liquid per unit time fed into the sprinkler. The information gained by these experiments can only be valuable when written records are kept. These records will show the operator how he can slow down or speed up production at short notice without unbalancing the plant unnecessarily. With this information to guide him he can control his plant so that there will be no need to change the charge at, say, midnight because the alcohol content happens to go down to 0·3% at that time.

Submerged culture

One of the disadvantages of this type of machine is that after a year or two the generator may show signs of sluggishness owing to the growth of slimy matter which clogs up the filling material. These difficulties are overcome in the latest vinegar manufacturing plant in which the bacteria are grown in submerged culture.[15] They do not live on a visible surface but actually in the liquid.

The liquid is contained in a wooden or stainless steel vessel containing a turbine at the lower end which forces air into the liquid and sets it into turbulent motion. In this way oxygen is fed into the liquid in which the bacteria are floating. The principal difference compared with the old process is that the air trickles through the liquid instead of the liquid through the air, while the bacteria are not settled on solid matter, but are floating.

The work of Hromatka and Ebner[16] and others[17] led to the construction of the *Acetator* by Messrs. Heinrich Frings, of Germany, who had come to the same conclusions by following a more practical and technical line of thought.

Submerged culture plant is much smaller than the conventional plant and has a considerably higher rate of production. Where a generator using solid filling materials would produce 0·5 to 0·7% acid in 24 hr., the *Acetator* produces 4 to 6% in 24 hr. The advantages of the new method are:

1. Faster production, allowing better planning, as larger quantities of vinegar can be produced at short notice.

2. Gains in cost and convenience because of the elimination of the filling material.

3. The new generator can be started and shut off at any time.

4. The type of charge (cider, malt, wine, spirit) can be changed at once without obtaining a quantity of mixed vinegar, as with the old type of generator, where such a change takes days of leaching out all the previous charge with the new one.

5. Since most of the bacteria stay with the vinegar, this has a more superior taste: it is smoother and more full-bodied.

Vinegar eel

In a modern, well-equipped vinegar factory there is little likelihood of anything going wrong or of the product spoiling. Most of the "diseases" of a vinegar factory can be traced to primitive factory hygiene or machinery or both. One of the most common disorders is the vinegar eel, *anguillula aceti*. This is a nematode, a tiny worm-like animal of $\frac{1}{16}$ in. in length, just visible to the naked eye. They have been known in vinegar from early times and Leeuwenhoek[18] studied them under his microscope in 1685, discounting the theory that vinegar tastes acid because the eels prick the tongue with their tails! More to the point is the *Encyclopædia Britannica*, which states that the presence of *anguillula* is of æsthetic rather than physiological consequence since they are not harmful to man or animals.

The author has experienced a very serious infection with *anguillula* and followed the textbook cures of shutting off the air to choke them and raising the acidity. Neither of these methods was completely effective. The first threatened to kill the bacteria who were seriously affected by the lack of oxygen while the vinegar eels continued to flourish, and

raising the acidity had no effect upon them. However, it was found that raising the acidity was more easily achieved than before, and this point has been established by Zalkan,[19] who found that the presence of *anguillula* enhanced the productivity of the bacteria: he logically assumed some symbiotic interrelation. However, it must be remembered that the nematodes are animals which must not be allowed to decompose in the finished vinegar. The best way to eliminate them is to pasteurise and filter the vinegar in one operation, using a plate type heat-exchanger and a medium grain pad filter. If filtration does not follow pasteurisation, the dead eels will decompose and produce a smell of rotten fish.

The finished product

Vinegar is not ready for consumption until it has been matured in the wood. In contrast to Orleans vinegar, quick-processed vinegar tastes raw and sharp if not matured. After maturation it is fined, filtered and pasteurised.

When pasteurised vinegar is transported in the wood, great care must be taken in heat-sterilising the casks, using sterile hessian and clean bungs for bunging-up. With genuine wine, fruit and malt products it is rather difficult to sell the vinegar straight from the barrel without some turbidity or sediment developing. In these cases the barrel in use should be provided with an air filter at the bung hole in order to stop airborne infection. When shipping vinegar in the wood it is always advisable to include up to 50 p.p.m. of SO_2.

Besides the normal vinegars there are many specialities on the market which can be easily made after the basic vinegar is produced. The following are a few formulations for these flavoured vinegars:

TARAGON VINEGAR

Taragon herb	½ oz.
Salt	½ ,,
Wine vinegar	2 qt.

Infuse for 1 week, press off and filter.

TARAGON VINEGAR (GERMAN)

Taragon herb, fresh cut ..	7 oz.
Dill	7 ,,
Bay leaf	1 ,,

Moisten with S.V.R. or concentrated acetic acid, let stand for 2 days, then macerate with 10 gal. of 8 to 10% white vinegar.

ACETO AL ROSMARINO (ITALIAN ROSEMARY VINEGAR)

Rosemary herb	10 oz.
Peppermint herb ..	8 ,,
Angelica root	3 ,,

Macerate with 2 gal. of wine vinegar for 8 to 10 days.

FINE HERBS VINEGAR (FRENCH)

Taragon herb ..	3 oz.
Basilicum	3 ,,
Satureja	½ ,,
Thyme	½ ,,
Rosemary	1 twig
Eschalottes ..	½ oz.
Lemon	skin of 1, thin
Whole white pepper	60 only
Pimento	20 ,,
Bay leaves ..	10 ,,
Horseradish, sliced	1 ,,
Salt, roasted ..	½ oz.
Sugar	½ ,,

Fill into jar with 1½ gal. of wine vinegar, tie up, and let stand for 3 months.

WALNUT VINEGAR

Walnuts, green, cut ..	60 nuts
Eschalottes, chopped	5 oz.
Garlic, cut	1 piece
Cloves, bruised ..	6 only
White pepper ..	2 oz.
Ginger, cut	½ ,,
Salt	4 ,,

Fill into jar with 1 gal. of wine vinegar, tie up, and let stand for 3 months.

PICKLING ESSENCE

Oil of Pimento	½ fl. oz.
Oil of Nutmeg	30 minims
Oil of Cloves	90 ,,
Tinct. Capsicum	½ fl. oz.
Acetic acid 33%, food grade	20 ,,

Use 1 teaspoon per quart vinegar.

Acknowledgment.—The author wishes to express his thanks to Messrs. Heinrich Frings, Bonn, and particularly to Dr. F. Martens of their staff, for advice in writing this article. The illustrations have been supplied by Messrs. Frings.

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Food in Denmark

As part of a group, foodstuffs and beverages produce most by value of all the industrial groups in Denmark, where the largest single industry is canning. Statistics, facts and figures on Denmark's food and other industries are contained in a recent Overseas Economic Survey.* Details are also given of bacon, dairy products, eggs and other agricultural products.

An interesting point about the Danish food industry is the importance of margarine. There are more than 60 margarine factories and the consumption per head is much higher than that of butter, most of which is exported.

A fuller—and more fulsome—account of Danish agricultural products is contained in a semi-official publication put out by the Danish Agricultural Organisations.† It consists of chapters each dealing with a specific aspect of Danish agriculture. The dairy industry, meat and cattle, pigs, eggs and poultry, potatoes, apples and grain seeds are each dealt with in turn. Naturally, the largest sections are devoted to the dairy and pig industries. A list of Danish agricultural organisations is appended.

* *Denmark.* Overseas Economic Survey. Pp. 105 incl. appendices. 1955. H.M.S.O. 4s. net.

† *Danish Agriculture.* The Danish Agricultural Organisations. Copenhagen. Pp. 94 incl. index. Illus. No price stated.

The Milling Industry

By A. J. Amos, Ph.D., B.Sc., F.R.I.C.

During 1955 more than half of the imported wheat was Manitoban, but unfortunately there was no improvement in the quality, so that millers now have to use considerably more in their blends. The fine summer raised hopes that British wheats would prove unusually good, but this expectation was not realised. Following decontrol the extraction rate of National flour has gradually dropped, and throughout 1955 extraction was rarely greater than 74%; unless some of the master mix intended for "white" flours was added to these National flours, they fell far short of their supposed nutritional standard. In May a Commission was appointed to study the composition and nutritive value of flours of different extraction rates. Its report should be available soon. Agene treatment was ended during the year and has been replaced by chlorine dioxide and bromate. The bulk handling and storage of flour commanded greater attention during the year. The American brew ferment system of fermentation was followed with interest.

Wheat quality

THE quality of a flour is determined by the nature of the wheat from which it is milled and the efficiency and skill with which the milling operations are performed. A good wheat grist will produce a poor or unsatisfactory flour if the milling plant or the operation of it is at fault, but a poor wheat grist will yield poor flour even on the most modern and well-designed mill operated to the best advantage. The formulation of a good wheat blend is, therefore, the first necessary step in the production of good flour. The three criteria that a miller has to consider when compounding his wheat blend, apart from factors such as bushel weight and moisture content which influence milling behaviour, are protein content, protein quality and diastatic activity. The first two of these three factors jointly determine the physical properties of a dough made from the flour and hence the manner in which it responds to the manual and mechanical treatment it receives in the bakery and its ability to develop in the oven, while the third factor is an index of the power of the flour to produce a sugar from its starch.

The mill chemist or the cereal consultant called upon to provide a miller with advance information upon his wheats will, therefore, pay particular attention to the foregoing three attributes. He will arrive at the protein content by determining the nitrogen content and multiplying the figure obtained by 5·7. He will evaluate the diastatic power of a wheat by an empirical but closely standardised test which measures the amount of maltose produced when flour milled from the wheat is incubated in the form of an aqueous suspension. He will assess the protein quality by making a dough from flour milled from the wheat and subjecting this to a mechanical test which automatically records stress/strain relationships while the dough is being deformed. Several reliable dough-testing instruments suitable for the evaluation of the protein quality of wheat are on the market, but the author favours the Alveographe, and all the strength and stability figures recorded for wheat in this article were provided by this instrument.

The baking value of a flour is not determined solely by the strength of the protein; a flour of satisfactory strength may possess dough characteristics which render it unsuitable for the production of good bread. For optimum results a satisfactory level of strength must be accompanied by a pleasing balance between the various physical properties of the protein; a marked excess or a pronounced deficiency of any one property, such as, for example, stability or extensibility, will detract from or even completely spoil the breadmaking quality of a flour. Some knowledge of the nature of a gluten can be obtained from the stability and strength figures relating to it. If the stability figure exceeds the strength figure by 15 to 35 units, then the physical properties of the gluten are satisfactorily balanced. A stability figure which exceeded the strength figure by significantly more than 35 units—say, for example, by 45 units—would indicate that the protein of the wheat in question was stiff and lacking in extensibility, and this would mean that a dough made from flour milled from that wheat would be somewhat clay-like in nature.

The data to which attention should be directed when the baking quality and blending potentialities of wheat are under consideration are protein content, strength figure, numerical difference between strength and stability figures, and diastatic activity.

Imported wheat

During 1955 more than half of the imported wheat was Manitoban, and rarely did the proportion of the total Manitoban arrivals represented by No. 2 grade wheat fall below 50%. On occasions over 80% of the Manitoban wheat imported during one month was

No. 2 grade. The bulk of the wheat imports coming from elsewhere than Canada were distributed between wheat from Australia, the Argentine and France. Samples of all imported wheats passed through the author's laboratory, and the mean figures for 1955 which are quoted in this article have been calculated from the results of many hundreds of analyses.

In his review of the milling industry for 1954 (FOOD MANUFACTURE, February, 1955) the author commented upon the relatively poor quality of the Manitoban wheats received during the year, and pointed out the handicap which this situation placed upon the British miller, who relied upon Manitoban to serve as the backbone of his bread grist. Unfortunately, 1955 brought no improvement, the mean data for the year showing Manitoban in an even less favourable light. How great is the deterioration in the quality of Manitoban which has characterised the 1954 and 1955 arrivals is revealed in Table 1, where the mean figures for the 1955 imports are compared with those calculated from the author's analyses of the imports received during 1948, the first year in which the author reported average wheat data.

The fall in strength and protein content revealed in Table 1 means that current Manitoban wheat has less carrying power for weak wheat than it used to have, and consequently millers now have to use a considerably higher proportion in the blend.

Plate wheat varies considerably in strength and protein content; many samples are typical "fillers," *i.e.* wheats which require no support from stronger wheats but cannot themselves carry any weaker wheat, while on occasions others may reach the standard of Manitoban in strength and protein content. Most of the 1955 arrivals were of the filler type in strength, but they were as proteinous as the current Manitobans. The average figures were: protein, 12·31%; maltose figure, 1·50; stability, 84; strength, 48.

TABLE 1

Average Data for Manitoban Arrivals during 1955 Compared with those of Manitoban Imported in 1948

	1955				1948		
	Protein Content	*Maltose Figure*	*Stability*	*Strength*	*Protein Content*	*Stability*	*Strength*
No. 1 ..	12·40%	1·75	90	63	13·42%	99	77
No. 2 ..	11·95%	1·70	87	57	13·35%	99	75
No. 3 ..	11·85%	1·70	88	58	13·08%	103	73

TABLE 2

Average Data for English Wheat Available during 1954 and 1955

		Protein Content	*Maltose Figure*	*Stability*	*Strength*
English with strength figures below 30	1954 ..	9·58%	1·60	49	20
	1955 ..	9·27%	1·65	46	20
English with strength figures above 30	1954 ..	10·20%	1·80	80	36
	1955 ..	10·35%	1·75	72	36

Australia grows some very strong and proteinous wheats, but they are used for home consumption, and the Australian wheat exported to Britain is weak and low in protein content. The cargoes which arrived during 1955 were typical and the average figures they provided were very much like those calculated from the data of 1954 arrivals. The average data were: protein, 9·50%; maltose figure, 1·70; stability, 66; strength, 27.

The Red Winter wheat which arrived during 1955 was similar in strength and general protein characteristics to the 1954 arrivals but was slightly higher in protein content. It was similar in strength to the Australian wheats, but had a higher protein content, and the protein was less stable and more distensible. The mean data were: protein, 10·50%; maltose figure, 1·25; stability, 50; strength, 27.

French wheat was imported throughout the year. In protein content and protein quality it is very much like English wheat and it could be used in place of the latter. The mean data for the 1955 arrivals were: protein, 8·68%; maltose figure, 1·70; stability, 53; strength, 23.

During the early months of 1955 a few cargoes of Uruguayan wheat were imported. These were useful wheats of the filler class and with one exception had good protein contents. The mean data were: protein, 11·40%; maltose figure, 1·65; stability, 80; strength, 45—figures which are not much inferior to those of the Argentine wheats received during the same year.

Several cargoes of Russian wheat arrived. These had good protein contents, but were weak wheats, being no stronger than English. Typical figures were: protein, 12·84%; maltose figure, 1·90; stability, 45; strength, 20.

British and Irish wheats

The fine weather of the summer months and the excellent harvesting conditions gave rise to some expectation that the British wheats would prove to be unusually good, but this expectation was not realised. The average moisture content was significantly below that of the 1954 crop, but neither the protein content nor the strength, upon which hopes were focused, proved to be above the general average for home-grown wheat. Indeed, numerous samples of the stronger varieties, such as Holdfast and Atle, were somewhat below the usual standard of strength. Similar results have been observed in other hot and dry seasons.

When average figures for the year are calculated, the results obtained are remarkably close to the corresponding figures for 1954, as can be seen from Table 2.

The average maltose figure for English wheat was about 2 in

May, but by December, when the 1955 crop was being used, this figure had dropped to about 1·45. Each maltose figure quoted in Table 2 is the average for a year and hence covers two crops.

The standard of strength desired by a miller in his English wheat depends upon the purpose for which he uses the wheat. When he is employing it in a bread grist he looks for good strength and stability because the better his home-grown wheat the less does he need imported and more expensive Manitoban. On the other hand, should he be producing biscuit flour he wants the strength figure and protein content of his English wheat to be as low as possible. While, therefore, there is a specific need for stronger and for really weak English wheats, the intermediate types are less useful; they are too strong for biscuit work but not strong enough to effect a useful saving in Manitoban.

The dry weather of July and August led to the presence in several samples of English wheat of larvæ of the Saddle Gall Midge (*Haplodiplosis equestris*). The eggs of this insect are laid on the leaves of wheat plants and the larvæ hatched from them make their way to the stem beneath a sheath where they feed on the sap. The larvæ, which are red in colour, are fully grown by July-August, and if moisture is adequate they descend to the soil, where they remain as resting larvæ. In particularly dry seasons, however, the larvæ appear to be unable to leave the stems and may be removed from the field with the wheat. The larvæ do not attack the grain and, if present in threshed wheat, are removed during the cleaning operations in the mill.

The 1955 crop in Eire was vastly superior to the 1954 crop in moisture content and in freedom from sprout, and this resulted in the maltose figures dropping from nearly 3 in July to about 1·5 by December. On the other hand, many samples of the new crop were weaker. The drier nature of the 1955 crop called for much less intensive drying and in consequence not many samples were encountered which had heat-damaged glutens. The average data for the year, which are given in Table 3, show a fall in strength compared with the corresponding figures for 1954.

TABLE 3

Average Data on Irish Wheat Available during 1954 and 1955

	Protein Content	*Maltose Figure*	*Stability*	*Strength*
1954	10·67%	1·95	83	36
1955	10·03%	2·40	62	27

Grain spoilage during storage

Geddes and his co-workers at the University of Minnesota contributed further papers to their series entitled "Grain Storage Studies" and thereby added to the considerable knowledge they had previously gained about the rôle of fungi in the deterioration of stored grain and particularly in the production of "sick" wheat. They concluded that in all probability the invasion of the germs of commercially stored wheat by species of *Aspergillus* is a common cause of "sick" wheat. *A. restrictus*, a slow-growing member of the *A. glaucus* group, was a predominant mould on sick wheat, and the fact that it was difficult to detect by cultural means may explain why it had not previously been reported as an invader of stored grain. As invasion of stored wheat by this mould increased, germinating power decreased and the germs developed a brown colour characteristic of sick wheat.

Laboratory trials revealed that even when the stored wheat had a moisture content of 13·5 to 15·0%, *A. restrictus* invaded the grain during a storage period of sixteen weeks. Related studies showed also that wheats heavily infected with moulds continued to deteriorate, as evidenced by a progressive increase in germ damage and fat acidity, although the mould counts decreased, when they were stored at 13 to 14% moisture content, if they had previously been subjected to a temporary storage at high moisture content. These facts suggest the accepted "critical" moisture levels for grain storage, often in the region of 14 to 14·5%, may be too high, and figures in excess of 13·5% may not be safe for long-time storage of wheat.

Wheat grists

The only strong type of wheat imported during 1955 was Manitoban. The other wheats which arrived regularly were Plate, which is a filler wheat, and Australian and French, which are weak wheats. Owing to the poor quality of the Manitoban it had to be used in a high proportion in order to maintain sufficient strength in the flour. It was not uncommon to find 65% of Manitoban in bread grists and proportions approaching 80% were encountered on occasions. Some grists consisted only of Manitoban and English wheat, whereas in others a mixture of English, French and Australian wheats constituted the weak group, and a proportion of Plate wheat was present as a filler.

Many mills produced in addition to their bread flour a much weaker flour which was used by bakers in conjunction with imported strong Canadian flour for the production of bread. Two types of such flour were produced, an English National and a Soft National. The former was made from all home-grown wheat, while the grist for the latter often consisted of about 80% English wheat and 20% Manitoban wheat

Biscuit flour was produced in the main from English wheat, but care had to be exercised in the choice of the wheat. It is not enough that a biscuit flour is weak; biscuit manufacturers require in addition a gluten that is distensible and lacking in elasticity. Many English wheats which are weak yield flours which are not acceptable to the biscuit manufacturer because of insufficient distensibility or too much elasticity in the gluten. The

stronger types of native wheat such as, for example, Holdfast, Atle and Koga II, are quite unsuitable for the production of biscuit flours.

Flour quality

The situation with respect to extraction rates remained unchanged during 1955; millers could make flour of any extraction they chose, but if the rate of extraction was less than 80% then the flour had to be fortified with a specified proportion of a master mix containing thiamine, nicotinic acid and iron. The idea behind these regulations was that all flour would attain the nutritive standard recommended by the Conference on the Post-War Loaf; if the flour were of 80% extraction then the three token nutrients would be present in the desired amounts naturally, while flours of lower extraction would have their deficiencies made good by the obligatory fortification. It was mentioned in the review of the industry for 1954, however, that following decontrol the extraction rate of National flour gradually dropped, and throughout 1955 National flour of supposedly 80% extraction was rarely produced at an extraction greater than 74%.

Unless some of the master mix intended for "white" flours was added to these National flours they fell far short of their supposed nutritional standard.

No marked change occurred during 1955 in the colours of the National and the white flours. The former continued to give a grade figure of about 3, as compared with a figure of 5·5 which would be typical of true 80% flour, while the white patent flours usually had figures in the region of 0·5.

Later in the year many bread flours had maltose figures which provided little margin of safety under commercial conditions. These flours were capable of producing good bread, but there was a risk that under adverse conditions they might yield loaves which were below par in volume or crust colour. As a precautionary measure many millers had recourse to the addition of malt flour, the common practice being the inclusion in each 280 lb. of flour of ½ lb. of malt flour at 80° Lintner. The addition of fungal enzymes might have been a better solution of the problem, but these products are not yet available in this country.

Flour treatment

In December, 1954, Mr. Heathcote Amory, Minister of Food, announced in an official answer to a question in the House of Commons that the National Association of British and Irish Millers was recommending its members to give an undertaking that equipment for treating flour with agene would be removed from their mills by the end of 1955. He also stated that investigations undertaken by the Medical Research Council on chlorine dioxide and bromate had shown no reason why these improvers should be discontinued, but they would be kept under close scrutiny in collaboration with the milling and baking industries. During 1955, therefore, there was a gradual disappearance of the agene process from flour mills and a replacement of this form of treatment by chlorine dioxide, and in some small mills by chlorine. Chlorine dioxide is a more potent improver than nitrogen trichloride and needs to be added to flour at only about half the dosage employed for agene. Detailed studies of chlorine dioxide-treated flours have been made chemically and biologically and much evidence of their harmlessness has been accumulated.

Although chlorine dioxide is a potent improver it does not bleach as effectively as nitrogen trichloride, and it is customary, therefore, for millers to meet the general demand for white bread by supplementing the bleaching effect of chlorine dioxide with a small amount of benzoyl peroxide.

Potassium bromate, a long established and widely used improver, is particularly useful in flour which is to be employed in a plant bakery, where loaves of a regular size and shape are required in order to avoid difficulties in the automatic slicing and wrapping operations. It is, therefore, usual for millers to supplement a moderate gaseous treatment with a light treatment with bromate when flour for plant bakeries is being made.

Calcium carbonate, in the form of *creta præparata*, is still added to all flour, except wholemeal, in a proportion of 14 oz. per 280 lb. of flour. The chalk has no effect upon baking quality but is added as a nutritional supplement. The fact that the obligatory inclusion of this calcium salt does not extend to wholemeal gives rise to the illogical situation in which bread containing the highest proportion of the calcium-immobilising phytic acid contains no added calcium, whereas high grade patent flour which contains an insignificant amount of phytic acid carries over 0·3% of a supplementary calcium salt.

The nutritive value of flour

When the milling industry was decontrolled in September, 1954, regulations were introduced which were intended to ensure that all flour attained the standards recommended by the Conference on the Post-War Loaf for the "token" nutrients, thiamine, nicotinic acid and iron. This end could be accomplished naturally by milling to 80% extraction, the flour thus produced being termed National, or by milling to a lower extraction and fortifying the product with a prescribed amount of the three token nutrients. Bread made from National flour attracted a subsidy and hence retailed at a cheaper price than bread made from fortified white flour. During the two years which have elapsed since decontrol there has been a gradual drop in the extraction rate of National flour, with the result that National bread is now inferior in nutrient content to that made from fully fortified white flour. In the light of the Widdowson and McCance report, which was discussed in the previous annual review of the milling industry, and of the data published by the National Food Survey Committee,

BULK FLOUR HANDLING. Already well established in America, the many advantages of this system for large bakeries have led to its adoption in this country. This photo shows the intake floor at the Harlesden biscuit factory of McVitie and Price. Flour, delivered by bulk delivery wagons, is elevated to the top of the silo where a Simon Multiway valve (*left foreground*) passes it to one of seven main bins.

it is arguable whether the present nutritive status of National bread represents a nutritional hazard, but the position cannot be permitted to stay as it is without clarification. In May, therefore, the Ministry of Agriculture, Fisheries and Food, in conjunction with the Secretary of State for Scotland and the Ministry of Health, appointed a Commission to review the scientific and medical evidence available on the difference in composition and nutritive value of flours of different extraction rates. The Commission appointed under the chairmanship of Sir Henry Cohen, Professor of Medicine, University of Liverpool, consisted of L. J. Witts, Professor of Clinical Medicine, University of Oxford; J. H. Gaddum, Professor of Materia Medica, University of Edinburgh; A. C. Chibnall, formerly Professor of Biochemistry, University of Cambridge; and R A. Morton, Professor of Biochemistry, University of Liverpool. The formal terms of reference of the Commission were:

> "In the light of the scientific and medical evidence now available—
>
> (1) to determine the differences in composition and nutritive value between
>
> (*a*) National flour as defined in the Flour Order, 1953;
>
> (*b*) flour of extraction rates less than National flour as defined in the Flour Order, 1953, to which the three token nutrients have been restored;
>
> (*c*) flour of extraction rates less than National flour as defined in the Flour Order, 1953, to which the three token nutrients have not been restored; and
>
> (2) to advise whether any such differences are significant from the point of view of the health of the population."

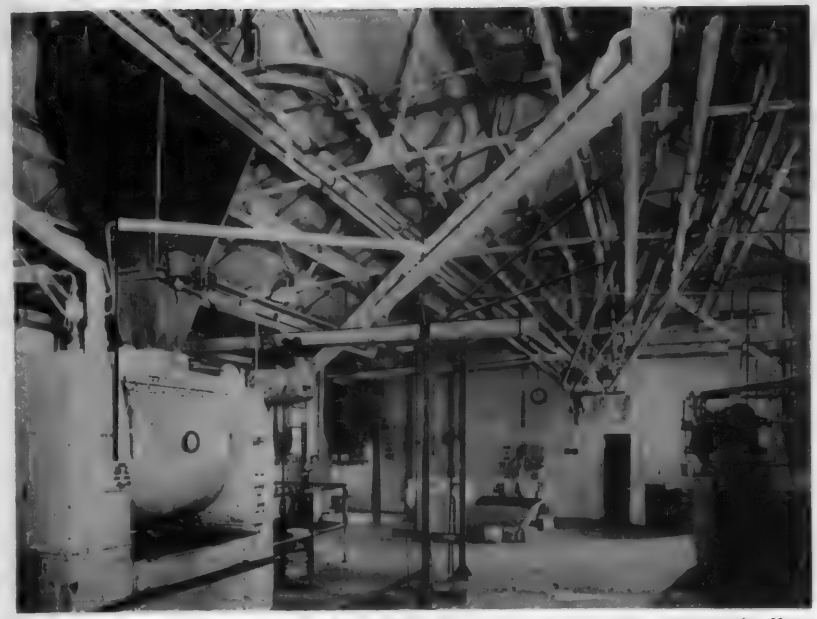
The Commission has heard evidence from a number of interested parties and it is anticipated that it will be making its report early in 1956.

Bulk handling and storage

A mill in which wheat is converted into flour, and a plant bakery in which the flour is made into bread, are both highly efficient mechanical plants in each of which the conversion of the raw material into the finished product is entirely automatic. By comparison, the treatment to which flour is subjected between the miller finishing with it and the baker putting it into his dough mixer is highly inefficient. In the mill the sacked flour is stacked by

The ground floor of the McVitie and Price bulk flour installation. Down the centre is a Simon Aeroflow conveyor with twin worm dischargers feeding into it from the main storage bins above.

hand and later unstacked and loaded on to delivery vehicles, and on reaching the bakery the sacks have to be unloaded and restacked in the flour store. In addition to its high labour costs, such treatment leads to loss of flour on floors, tends to favour infestation and calls for the installation of sack-cleaning and sack-repairing machines. These difficulties can be avoided and the link between the mill and the bakery made efficient by handling and storing the flour in bulk. This procedure is feasible only for large bakeries drawing their flour from large mills, but it is already well established in America and is in operation in Britain. The system requires flour storage bins at the mill and the bakery, which can be made of steel or concrete and can be circular or rectangular in cross section, and a special bulk flour wagon for transporting the



After the batches have been weighed the flour passes into the pneumatic lines feeding the service bins over the dough mixers.

flour from the miller's bins to the baker's bins. A pre-weighed quantity of flour is discharged from the mill bins into the bulk wagon, and upon arrival at the bakery it is blown from the wagon into the bins by a pneumatic system worked from the engine of the wagon, the rate of discharge being about 20 tons an hour. From the bakery bins the flour as required is conveyed mechanically to the dough mixers, passing through a sieve *en route*. Advantages claimed for bulk handling and bulk storage by baker users are:

1. Protection of the flour from the weather during transit from mill to bakery.

2. Avoidance of contamination, including sack hairs, during transit and storage.

3. Elimination of cost of labour for handling from vehicle to store and from store to process.

4. Elimination of loss due to spillage, torn bags, and residue remaining in emptied bags.

5. Elimination of expense involved in handling, cleaning and storing bags and of necessity for capital to be tied up in bag charges.

6. Improvement in hygiene through elimination of returnable bags.

7. Accurate measure of flour delivered provided by weights of delivery vehicle before and after off-loading.

8. Increased storage capacity per unit of floor space.

Bulk handling and storage of flour would be uneconomical at present for the small baker, but a possibility under consideration is the delivery of small consignments of flour from bulk vehicles into portable containers in a bakery. Such a scheme would avoid the high initial cost involved in the installation of bulk storage bins.

Brew ferments

The milling industry always pays attention to trends in baking technology because these may lead to a demand for changes in flour characteristics. Therefore it has followed with interest the development of a brew ferment system of fermentation in America. This process derives from the introduction of the continuous breadmaking system in which the yeast was metered into the continuous mixer in the form of a previously prepared suspension which contained sugar and various yeast foods in solution, this suspension being known as a brew ferment or yeast broth. The use of a yeast broth of this nature has now been adopted in a number of American bakeries making bread by otherwise conventional methods. The practice is being advocated by the American Dry Milk Institute, possibly because dry milk solids have been recommended as a useful form of buffering agent. The basic ingredients of a brew ferment are yeast, sugar and water, but dry milk solids or calcium carbonate are included in order to maintain the *p*H at about 5, while salt and ammonium chloride, which serves as a yeast food, are other possible ingredients. It makes little difference whether all the yeast is added to the ferment or whether part is included in the brew and part in the dough. It is usual to divide the yeast between the two stages of the process, about two-thirds of the total being included in the brew. The salt is also divided between the brew and the dough, usually about half the total being used at each stage. The earlier brew formulæ called for the use of 70 to 100% of the total water in the brew, but more recently concentrated brews containing only 30 to 50% of the total water have been recommended. These latter would seem to give better bread, and they have the advantages of permitting greater adjustment of temperature during the doughing stage because of the greater volume of water that has to be added at that operation, of offering easier adjustments of yeast and liquor contents in different doughs, and of requiring smaller ferment tanks. The brews are allowed to ferment for 3 to 6 hr. at a temperature of 85 to 100°F., and the subsequent dough is fermented at 85 to 90°F. for 30 to 60 min.

Standard for refrigerator oils

Four grades of refrigerator oils are provided for by a new British Standard (B.S. 2626: 1955) for use in any size of refrigerating plant operating with CO_2, ammonia, SO_2 and halogenated hydrocarbons. No attempt has been made to recommend an oil for a specific application as this is considered to be the responsibility of the plant designer. The standard is obtainable from the British Standards Institution, Sales Branch, 2, Park St., London, W.1 at 10s.

The Ice Cream Industry

By E. Humphriss, A.R.I.C., M.I.BIOL.

There were no revolutionary technical developments in the ice cream industry during 1955, and at first glance it would appear that only the weather is left to comment on. However, there were in fact many trends and minor occurrences, ranging from hygiene to vending machines, which deserve to be discussed.

TO COMMENCE with the weather, and it still merits first place in any appraisal of the ice cream industry last year—it was truly phenomenal. As a direct result the industry found itself in the unique position of being unable to keep pace with demand. In more than one instance, both production and distribution proved inadequate, to the annoyance of the retailer and the chagrin of the consumer. This, of course, must not, and we have every confidence, will not happen again. Future production and distribution must be planned to contrive greater flexibility and resilience, on the assumption that the seven lean years are behind us, and six of the seven fat ones ahead.

The Clean Food Act

Although of no direct bearing on the ice cream industry as such, it must be recorded that the Foods and Drugs (Amendment) Act, 1954, consolidated with the 1938 Act, became the Foods and Drugs Act, 1955, and reached the Statute Book during the past year. The first Regulations made under this Act, Statutory Instrument, 1955, No. 1906 (Food Hygiene) came into operation on the first day of January 1956, and therefore do not really come within the purview of this survey, nor is there any specific reference to ice cream therein, except to exclude it from the requirements as to temperatures at which certain foods are to be kept (Reg. 25, 1 (*b*), p. 8).

Most of the general hygienic requirements of these new Regulations are already complied with by the ice cream trade; the familiar "no smoking, no spitting" is now amplified and extended to preclude snuff taking as well (Reg. 9 (*e*), p. 5). If there remain any such within the industry, they had better take heed. and confine their addiction to off-duty hours!

Methylene Blue test

The modified Methylene Blue test remains the most popular criterion by which the hygienic quality of ice cream is assessed by the officers of the local authorities. It also retains all its well-known unsatisfactory features, and continues to enjoy well-merited neglect by virtually all knowledgeable microbiologists within the industry. During the past few years, views on the true significance of presence of so-called *fæcal coli* in ice cream, as well as other foods, have changed or are, at least, changing. Prof. Crossley discussed the relative merits of the various bacteriological tests applied to ice cream (I.C.A. conference, Southport Oct., 1955), and pointed out the fallacy of assuming that *fæcal coli* in a food product always indicates a direct pathway of contamination from excretal sources to food. It may well be that *fæcal coli* do deserve notice, not so much as "indicator organisms" but as pathogens in their own right, particularly if present in a product popular with the younger section of the community. The several serotypes of *Escherichia Coli* now generally regarded as causally associated with infantile diarrhœa, and apparently also capable of causing intestinal upset in adults, are seemingly all indole-producing methyl red positive types. Whether they are all Eijkman positive I do not know; the important thing from the ice cream bacteriologist's point of view is surely to regard *fæcal coli* as potentially dangerous, intrinsically if not indicatively. The obvious corollary to this is to ensure their absence, always, from ice cream, for there is no doubt that the presence of coliform organisms, fæcal or otherwise, in ice cream virtually always indicates avoidable plant, etc., contamination. One can safely claim that each year's experience, when reviewed, amply confirms this view.

Egg and Salmonellæ

About ten years or so ago, the ice cream trade, along with other users of dried egg, were officially warned of the possibility that this commodity might harbour Salmonellæ, and were advised as to the heat-treatment necessary to ensure the safety of food products containing same. More recently, the incidence of Salmonellæ infections in Chinese egg products, including frozen whole egg, has been investigated. Several important papers bearing on this subject were published during the past year. Ice cream mix containing egg products, which is heat-treated (pasteurised) in accordance with the regulations now in force, is safe. For the ice cream manufacturer using such egg products the matter does not end there. Storage of the egg, and more particularly the handling and disposal of emptied, egg-soiled containers, should be carefully organised in such a way as to avoid any possibility of multiplication of organisms in these residues, and of cross-infection and contamination, both of plant, product, and personnel, by any agency whatsoever, not excluding flies.

Two "ice creams" by law?

Encouraged no doubt by the success achieved in the Foods and Drugs Act, 1955, wherein the use of the word "cream" is restricted and/or qualified adjectivally by terms such as "imitation," powerful influences last year turned their attention, in the same sense, to ice cream. The matter was ventilated at the Southport Conference by the Marketing Officer of the Milk Marketing Board, who proposed that the description "ice cream" should be restricted to an all milk fat product. The speaker was good enough to suggest that present day ice cream which contains 10% or so M.S.N.F., anyway, could be given some other name. Rather surprisingly, the trade appeared to accept the suggestion almost complacently; one spokesman apparently views the projected development as something inevitable. Be this as it may, our own view is that there just is not room for two legally defined grades of "ice cream," for the consumer will in any case continue to buy the most delectable product at the competitive price. The advocates of a "nothing but milk fat in ice cream" policy would do well to study carefully the results of the tasting tests laid on at Southport, some of which, it must be confessed, shattered even the present writer!

Ingredients

The several comparatively new, edible, surface-active compounds recently introduced should prove of interest to the ice cream technologist. It does not necessarily follow that glyceryl monostearate, with its normal quota of admixed distearate, is the last word in emulsifying agents as used in ice cream. Last year saw at least one make of polyoxyethylene sorbitan ester launched with due ceremony at, if we remember rightly, the Dorchester Hotel, London. There would appear to be a worthwhile field for technical research here.

Experimental work on the use of ethyl methyl cellulose and carboxymethyl cellulose as stabilising agents in ice cream continued in Great Britain, and apparently the commercial use thereof expanded elsewhere during the past year. Unless carefully employed, these cellulose ethers, in our own limited experience, tend to cause "syneresis" effects when the ice cream remelts. This may well be largely of theoretical interest since not many people delay eating their ice cream long enough for such an effect to become apparent—a matter of hours, anyway.

The British Standards Institution last year reprinted B.S. 2472: 1954, "Methods for the chemical analysis of ice cream," and also issued a British Standard covering "Refrigerator oils" (B.S. 2626: 1955), both of which should be available in laboratories concerned with these aspects of ice cream manufacture.

With the aid of quaternary ammonium compounds, in one case employed as an overnight bacteriostatic agent, and in the other used as a detergent-cum-chemical sterilising agent, one easily resolved two otherwise rather intractable plant contamination problems which obtruded themselves at the height of last season's peak demand period. From chance observation and enquiry, it seems that the peculiar advantages possessed by this class of compound are still not fully appreciated by the rank and file of the ice cream industry.

The tendency in regard to ice lollies appears definitely towards an intrinsically better quality product. Manufacturers are now fully awakened to the necessity for the absence of lead from these popular frozen confections, and aware of the means of ensuring this; so that, by and large, last year was a satisfactory one for both the makers and juvenile devotees of this oral coolant!

Packaging

Packaging, particularly the direct-extrusion-wrapped, heat-sealed method, and automatic vending, both made progress during 1955. The former was further developed, and a most interesting paper was published recording the bacteriological results of a season's operation; the latter made its appearance before the general public, where people foregather to buy and consume ice cream. Two automatic vending machines at least are located in fish and chip shops, with encouraging results.

Last summer certainly highlighted one aspect of the ice cream business which has not perhaps yet received the attention it merits. This is the litter problem, made worse by discarded wrappers, cartons, etc. It is unfortunately true that litter tends to accumulate, to the detriment of the locality, where ice cream is sold out of doors. It is admittedly a difficult problem, accentuated last year by the long summer, and one for which the ice cream trade is only partly responsible; nevertheless the industry might well think of ways of helping to alleviate it.

Perhaps, on this note, with just a hint of problems yet to be solved, and with a fervent wish for another of the fat years in 1956, we should close this review. The past year must be counted a profitable one on any assessment, carrying its rewards and lessons for the future.

Hungarian Sugar Syrups

A process has been developed in Hungary for the preparation of a solid product with a high glucose and a low fructose content, and of a syrup with a high fructose and low glucose content using the equipment and chemicals of a sugar refining plant. The principle of the procedure, according to *Cukoripari Kutatóintézet Közleményei*, is the elimination of an essential part of the fructose from totally inverted sugar juice by the use of slaked lime. After filtration and saturation, the liquor enriched in glucose is concentrated. The precipitate containing calcium fructosate, calcium carbonate and excess lime is suspended in water, saturated, and finally concentrated, yielding a syrup rich in fructose. The product with a high glucose content is a useful nutrient or medicament for persons suffering from heart ailments and the product rich in fructose is suitable for diabetics, it is claimed.

De-stalking paprika ready for drying in South Hungary.

The new factory of the Kalocsa District Red Paprika Enterprise in Hungary. The workers in the foreground are preparing ropes of paprika for drying.

Hungary modernises Paprika Plant

To meet increasing orders from abroad for paprika—the spice which puts the "lash" into goulash—considerable modernisation has been carried out at the Kalocsa Red Paprika Enterprise in South Hungary.

A new drying machine which went into operation in October can dry 150 tons of raw paprika in 24 hr. Production of the factory has already shown a substantial increase, output for the first three quarters of this year being 126·9% of plan.

Though Hungarian paprika is now considered the best in the world, the plant did not originate in Hungary. It came from Brazil and was introduced into Hungary during the Turkish occupation centuries ago, when it was first called "Turkish pepper."

The modern paprika drying plant which was put into production last year.

Filling sacks with ground paprika.

The Confectionery Industry

By R. L. Kenny, B.Sc., F.R.I.C.

The supply of cocoa and cocoa butter was thrown into prominence by the biennial Cocoa Conference held last September. Although the price of cocoa butter has declined, consideration is still being given to the provision of substitute fats. The food colour proposals were of particular interest to the confectionery industry, which is a big user of coal tar colours. Some progress was made in the prevention of misleading descriptions. The abnormally warm weather brought problems, particularly to chocolate manufacturers.

PERHAPS the most notable event in the past year was the biennial Cocoa Conference which was held in London last September and which was attended by over 240 delegates, including representatives from practically all the principal cocoa-growing countries and also several organisations with a direct interest in cocoa throughout the world.

The main purpose of the Conference was to facilitate an exchange of views between producer and consumer and, while the main emphasis was placed on research reports, there was considerable discussion on the future trend of the price of cocoa.

Research on cocoa

Much attention was devoted to the cultivation of cocoa, with particular reference to the environmental requirements. A proper understanding of the conditions to give the maximum yield was considered absolutely necessary, and in this respect it was interesting to note that a great number of ideas previously considered fundamental were now found to be less important.

Emphasis was laid on the need for fertilisers and the effect of light and shade on yield. The study of soil chemistry so as to permit treatment with the correct fertiliser has received much greater attention, and the experiments which have been conducted in Trinidad on the effect of light and shade were of particular interest, indicating that given the proper conditions yields per acre today could be stepped up by very surprising amounts.

One of the conclusions reached in connection with the discussions on field research was that conditions which were absolutely right for growing cocoa in one part of the world needed complete modification to obtain the best results in an entirely different climate, and this would account for what would appear to have been lack of agreement in assessing the best methods of cocoa cultivation, which makes the whole problem so very intriguing.

Price of cocoa

The price of cocoa suffered a sharp set-back, and after starting the year at over 380s. per cwt., it has now stabilised at approximately 250s. Such fluctuations are considered bad for the industry because they prejudice the eating of chocolate and there is a danger of the public developing a preference for sweet confectionery and even for other types of specialised food products.

This is one aspect which has caused concern, but there is also a limit which can be reached at which the actual quality of the chocolate suffers because some manufacturers endeavour to keep prices even by reducing the content of cocoa butter. This trend even reached the stage where alternative fats were being put forward as substitutes for cocoa butter.

Cocoa butter problems

Fortunately, with the reduction in the price of cocoa to today's level, it has not been necessary to resort to the addition of other fats. However, it must be emphasised that the industry is not necessarily averse to using fats other than cocoa butter if they could be proved to reduce cost without diminishing the quality. So far, however, no such substitute fat has appeared.

Cocoa butter is a very complex mixture of glycerides and obviously it is possible to produce a fat which has an acceptable melting point, but the whole question of its behaviour during tempering presents quite a problem. During the investigation on this work, fair success was achieved by utilising these fats alone, but when they were mixed with cocoa butter they were not found to be quite so suitable. While the need for these fats has now lessened, no doubt this research will continue and the industry will have to keep an open mind on the subject. Nevertheless, on the facts known today, it seems unlikely that chocolate will be prepared with any fat other than cocoa butter with the exception, of course, of butter fat used in the preparation of milk chocolate.

Manufacturers' problems

The consumption per head of chocolate in most countries has declined, although the total consumption of confectionery has not altered very appreciably.

While at the time of writing no figures are available for 1955, an interesting chart has been prepared by Mr. D. H. Joss, the Secretary of the Cocoa, Chocolate and Confectionery Alliance, in connection with a paper which he read at the Cocoa Conference, which shows that in most European countries—the main excep-

tions being the United Kingdom and Sweden—the consumption of chocolate was lower in 1953 compared with 1954, while the amount of sugar confectionery consumed was higher in all the countries for which figures are available. This further emphasises that the continued high price of cocoa during the early part of 1955 was a bad thing not only for chocolate manufacturers in this country but for the industry as a whole, although the total consumption of sugar confectionery has not declined.

Unless prices are stabilised at a figure which will satisfy both producer and consumer, the manufacturer faces tremendous difficulties because he has already streamlined his production methods to the stage where the cost of raw materials represents a far higher proportion of the consumer price of the finished goods than in practically any other branch of the food industry. Fortunately, at long last the price is more realistic, and there is every hope that it will remain stable.

Colours for confectionery

Several legislative proposals have been put forward which have a direct bearing on the confectionery industry.

The first concerns colouring matter in foods. In spite of vigorous protests from the confectionery industry, the regulations concerning colouring matter have now been formulated although no date has yet been announced for the implementation of the Act.

The main change—a list of permitted colours to replace the old principle of a manufacturer being able to utilise any colour except those on a prohibited list—is too well known to require further discussion. It is sufficient to state that the main objections from the industry concern the practical difficulties of using a permitted list. In the first instance, unless a biological testing station can be set up, the list will remain extremely small because many colours which could reasonably be expected to be safe cannot be put into that category on account of the lack of testing facilities.

Secondly, the proposed permitted list is different from that which operates in America and Canada, and the consequent need for one set of colours for the home market and another for dollar markets places a very heavy burden on the manufacturer.

These food colour recommendations are of particular importance to the confectionery industry because it uses a greater variety of coal-tar colours than any other food industry.

The United Kingdom is the biggest exporter of confectionery in the world and, therefore, the industry feels acutely the need for uniformity in colour regulations between as many countries as possible.

The industry has always made it clear that its objections are mainly for the reasons stated above; no one advocates the use in foodstuffs of any suspect substances.

Misleading descriptions

Some progress has been made on the question of standards to prevent misleading descriptions of confectionery. The industry has now agreed, as a code of practice, that no goods shall carry the word "butter" in the descriptive title unless they contain a minimum of 4% butter fat.

Considerable discussion has also taken place concerning use of the word "cream" as part of a descriptive title, and a new paragraph has been incorporated in the Foods and Drugs Act, 1955, which relates specifically to this problem. It will be for the Courts to decide whether use of the word "cream" is misleading and it is only possible at this stage to give personal views as to whether it might be accepted. For example—the words "milk" and "cream" would possibly cause objection unless either of these ingredients was used in the recipe. When describing caramels it is reasonable to suppose that such a product is prepared from either milk or cream in one form or another. But when such a description is applied to chocolate peppermint creams, for example where the word "cream" has been accepted by the industry and the public as a synonym for fondant and only describes the texture of the centre, then it may well be that provided no pictorial attempt is made to represent dairy produce the description would be acceptable.

These are points, however, upon which it would not be possible for anyone to give a hard and fast opinion at this stage, but they are of considerable importance now that the Foods and Drugs Act has come into operation.

The question of antioxidants is one which has also received attention because manufacturers feel that, provided it is harmless, the addition of a chemical which tends to increase shelf-life is worth consideration.

However, there are many who take the view that as it is possible to use antioxidants to prevent the further deterioration of unsatisfactory material, they should be prohibited. One of the handicaps to progress in food technology is the fact that the possibility of abuse can prevent the acceptance of something which can be extremely beneficial.

Cool storage problems

The very warm summer of 1955 had two serious effects on the industry.

In the first place, because we are not equipped for such abnormal conditions, there was considerable deterioration of stock by fat bloom, and sales during the summer months suffered. Although manufacturers provide a limited amount of air-conditioned storage for finished goods, it proved totally inadequate in the abnormal weather of last summer.

More serious, however, was the fact that retailers were less well equipped for the storage of chocolate. Here again is perhaps another reason why sugar confectionery gained a little more ground at the expense of chocolate.

For these reasons, the break in the warm spell in early October found both the manufacturer and the retailer very short of chocolate stock, and as the last quarter of the year is by far the busiest from

(*Turn to page 70*)

THE VITAMINS–1

By F. A. Robinson, M.Sc., LL.B., F.R.I.C.
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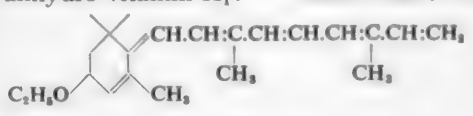
The most rapidly expanding field in vitamin research is once again that of vitamin B_{12}, and one of the most difficult structural problems ever attempted has been successfully solved with the announcement of the complete structural formula of this vitamin. The work has necessitated close collaboration between teams of organic and physical chemists, but the major contribution has undoubtedly come from the latter, who by means of X-ray analysis were able to determine the position of each group in the molecule, including those of methyl groups, which have hitherto escaped detection by this method. The results represent a major triumph for British science. Important information on the rôle of folic acid in enzymatic formylations has been published, and the connection between folic acid, vitamin B_{12}, betaine, choline, serine and glycine has been made a good deal clearer by recent work. A new pteridine related to folic acid, biopterin, has been isolated and its chemical constitution determined.

Complex nature of vitamin A

FURTHER details have been given[1] of the synthesis in crystalline form of four isomers of vitamin A (mentioned in last year's report), and measurement of their biological potencies. Neo-vitamin A acetate (the 2-mono-*cis* isomer) has a potency of 2190,000 units per gram, and the acetates of the 6-mono-*cis*, the 2:6-di-*cis* and the 2:4-di-*cis* isomers potencies of 634,000, 688,000 and 679,000 units per gram respectively. The 2:6-di-*cis* isomer has been described for the first time. The all-*trans*, 2-mono-*cis*, 2:6-di-*cis* and 6-mono-*cis* isomers of vitamin A aldehyde have also been synthesised and tested biologically; their potencies were found to be 3070,000, 3070,000, 581,000 and 637,000 units per gram respectively. A fifth isomer, neo-retinene *b*, was characterised as the 2:4-di-*cis* isomer; it had a potency of 1610,000 units per gram. The analogue of vitamin A aldehyde derived from α-ionone had less than 2% of the potency of vitamin A acetate. A possible new isomer of vitamin A has been reported in the eyes of crustaceans.[2] The so-called "anhydrovitamin A_2" has been shown to be an ethoxy anhydro vitamin A_1:



and vitamin A_1 has been converted into vitamin A_2 by way of retinene$_1$ (vitamin A_1 aldehyde). On bromination this yielded an unstable bromo-compound which readily lost hydrogen bromide giving retinene$_2$ (vitamin A_2 aldehyde). This was converted into vitamin A_2 by reduction with lithium aluminium hydride.[3]

Reference has been made in earlier reports to the difficulties of estimating the biological potency of vitamin A preparations because of the presence on the one hand of isomers of differing biological activity and on the other of substances that interfere with the spectrophotometric assay. A method has now been described[4] that enables the neo-vitamin A, all-*trans* vitamin A and vitamin A_2 in fish-liver oils to be separately determined. This is achieved by separation on columns of dicalcium phosphate 30 to 60 cm. long. The results were compared with those obtained by the geometrical correction procedure, which over-corrects the neo-vitamin A contribution to the total absorption by an amount that compensates for the lower biological activity of neo-vitamin A.[5] The two methods gave much the same result. An improved method for estimating vitamin A in margarine[6] has been described in which a column of defatted bone meal is used to free the vitamin A from substances that interfere with spectrophotometric assay. In another method[7] of eliminating such substances, partition chromatography has been used with paraffin oil as the stationary phase and various aliphatic alcohols as the mobile phase. A method of purifying milligram quantities of vitamin A has also been described.[8]

Conversion of carotene into vitamin A

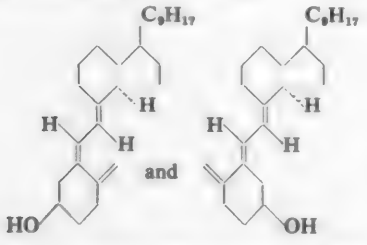
Interest is still being shown in the metabolism of vitamin A and carotene. More vitamin A was absorbed and stored when dairy calves were given an aqueous dispersion than when they were given an oily solution, and administration of vitamin A in milk resulted in more efficient utilisation than when capsules were administered.[9] Several antioxidants, including α-tocopheryl acetate, were found to interfere with the conversion of carotene into vitamin A *in vivo* when given in large amounts (10 mg. per day).[10] Under these conditions they may suppress the oxidative processes involved in the enzymatic conversion of carotene into vitamin A. The adrenal cortex appears to be involved in this conversion, since carotene accu-

mulated in the livers of normal or adrenalectomised rats given large doses of cortisone.[11] That the anterior pituitary hormone may be implicated in the metabolism of vitamin A is suggested by the observation recently reported that administration of this hormone to cows increased the amounts of vitamin A alcohol and ester in the milk.[12] When the diet contains carotene, this vitamin A ester can be derived from the liver or the diet according to whether it comes from vitamin A alcohol or vitamin A ester circulating in the blood. Dogs excreted up to 235 units of vitamin per day.[13] The modes of action of vitamin A have been reviewed by R. A. Morton.[14]

The antibiotic, aureomycin, increased the response of rats to vitamin A.[15] It appears to make available sufficient additional vitamin A to affect survival time and depletion time but not the amount stored in the liver.

Irradiation of ergosterol

Preliminary experiments directed towards a total synthesis of vitamin D have been reported.[16] It is now thought that ergosterol is converted on irradiation into precalciferol which is converted into calciferol by gentle warming.[17] It is suggested that the two substances are respectively:



Irradiated corbisterol (from the bivalve *Corbicula leana*) had the same antirachitic activity as irradiated 7-dehydrocholesterol when tested on rats, but the rat: chick efficiency ratio was about 100: 4.[18] Ergocalciferol and vitamin D_3 labelled with C^{14} have been prepared.[19] 4: 4-Dimethylcalciferol has been synthesised,[20] and several salts of vitamin D_2 -phosphoric acid have been prepared.[21]

The relationship between dihydrotachysterol (AT10) and vitamin D has been further studied. In normal rats AT10 increased the serum calcium levels and renal calcium excretion, and, when given prior to parathyroidectomy, prevented the fall in serum calcium;[22] calciferol was unable to replace AT10, which appears to function by removing calcium and phosphate from bone. Some patients with post-operative tetany whose plasma-calcium levels had been satisfactorily maintained for some time with calciferol became insensitive to calciferol even in large doses, but they responded satisfactorily to normal doses of AT10.[23]

A graphical extrapolation procedure has been described for the spectrophotometric estimation of vitamin D in Tablets of Calciferol B.P.[24] The antimony trichloride-acetyl chloride reagent has also been used for assays of this and other calciferol preparations, in association with a chromatographic procedure for removing decomposed calciferol.[25] The use of radioactive phosphorus in the assay of vitamin D is stated to give results in good agreement with those obtained by the line test.[26]

In a paper that may throw light on the mode of action of vitamin D, it has been reported[27] that, whereas on a diet low in calcium phytic acid is hydrolysed almost completely by rats even in the absence of vitamin D, with increasing amounts of calcium hydrolysis of the phytate was decreased. Under these conditions the addition of vitamin D increased the hydrolysis. It is suggested that the antirachitic action is due primarily to improved utilisation of inorganic phosphorus.

Physiological action of vitamin E

In spite of the failure to demonstrate that vitamin E is of importance in human nutrition, publications relating to vitamin E appear at intervals. The importance of the vitamin in chick nutrition has been confirmed[28] and it has been shown that the deficiency is not affected by pro-oxidants or other antioxidants. The addition of α-tocopheryl acetate to an all-vegetable protein diet increased the hatchability of turkey eggs, but had no effect on egg production or fertility.[29] It has been suggested that vitamin E acts as an unsaturated fat antioxidant[30] since it prevented the formation by oxidation of unsaturated fats of yellow-brown copolymers similar to the pigments characteristic of vitamin E deficiency; so, however, did other phenolic antioxidants. Other biochemical reactions in which vitamin E appears to be involved are: reversal of the inhibition of glucose uptake, glycogen synthesis and oxygen uptake brought about by alloxan;[31] the regulation of turnover rates of nucleic acids,[32] and the incorporation of formate into nucleic acids and protein;[33] and an effect on the oxidation of certain intermediates in the tricarboxylic acid cycle.[34]

Two methods of synthesising vitamin K_1 have been described recently,[35] while vitamin K_1 has been successfully employed in controlling the prothrombin times of patients maintained on ethyl biscoumacetate and phenylindanedione.[36]

Vitamin C

It has been shown[37] that ascorbic acid is oxidised to dehydroascorbic acid by a heat-stable, non-enzymatic factor in the insoluble portion of liver. The dehydro-ascorbic acid is further degraded beyond the diketogulonic acid stage by an enzyme system in the soluble portion of the liver. Ascorbic acid labelled with C^{14} is being used to study the fate of the vitamin in guinea-pigs,[38] and rats.[39] In the latter the half-life of ascorbic acid is 3·6 days and the amount synthesised is 5 to 8 mg. per day.

New titrimetric methods for estimating vitamin C have been developed in which the vitamin is selectively and preferentially oxidised by N-bromosuccinimide[40] and sodium 1: 2-naphthaquinone-4-sulphonate[41] respectively. As little as 7 μg per ml. can be estimated by the first of these methods. A rapid method of estimating reduced, dehydro- and total ascorbic acid has been described[42] in which the total vitamin is estimated by treating the

test solution with Norit and measuring the colour formed when the filtrate is heated with 2:4-dinitrophenylhydrazine and thiourea. The amount of dehydro-ascorbic acid is estimated in the same way without the Norit treatment, and the difference between the results gives the amount of *l*-ascorbic acid present. Ascorbic acid, like so many other vitamins, appears to be involved in the operation of the tricarboxylic acid cycle, and the oxidation of citrate was reduced in vitamin C-deficient guinea-pigs and in mitochondrial preparations of livers from deficient guinea-pigs.[43]

Apart from a paper[44] showing that infants excrete a smaller amount of thiamine in the urine when carbohydrate is substituted for fat in the diet, little work of nutritional significance concerning thiamine has been published during the year. Analogues of thiamine have again been used to throw light on the function of the vitamin. Thus neopyrithiamine and oxythiamine increased embryonic mortality and decreased hatchability when injected into eggs,[45] the simultaneous administration of thiamine preventing this inhibitory action. Again, oxythiamine diphosphate, but not oxythiamine or neopyrithiamine, inhibited the enzymatic decarboxylation of α-ketobutyric acid.[46] Evidence from other types of work suggests that thiamine is concerned in the conversion of tryptophan into formylkynurenine[47] and in the utilisation of glucuronic acid for ascorbic acid synthesis.[48]

Intestinal synthesis of vitamins

New light is being thrown on the highly controversial subject of the synthesis of vitamins by the intestinal flora of animals by means of experiments with germ-free chicks. It has been reported[49] that deficiencies of thiamine, riboflavin, nicotinic acid and folic acid are somewhat more acute in germ-free than in normal chicks. Very surprisingly the excreta from these chicks were found to contain sufficient of each of the vitamins to save their lives if injected or given orally, although the vitamins could not have been derived from intestinal bacteria. Baby pigs require about 1 to 5 mg. of thiamine per kg. of food (solids) to promote optimal growth.[50]

A new method for the microbiological assay of thiamine has been described[51] in which the amount of pigment produced by the fungus *Tuberculina persicina* is used as a measure of the amount of thiamine in the medium. Circular paper chromatography has been used to estimate thiamine and riboflavin in multi-vitamin preparations.[52] A method of estimating thiamine in vitamin concentrates containing creta preparata has been described.[53] The use of thioglycollic acid, thiomalic acid and other sulphur-containing compounds for stabilising aqueous solutions of thiamine has been patented.[54]

Riboflavin, like thiamine, appears to be concerned in the metabolism of tryptophan, probably being necessary for the hydroxylation of kynurenine.[55] An analogue, 5′-desoxyriboflavin caused a slight regression of lymphosarcoma transplants in mice.[56] A new method of estimating riboflavin by light absorption and polarographic methods has been described,[57] and a paper on the separation of riboflavin from its derivatives by paper electrophoresis has been published.[58] The use of suspensions of riboflavin in oil gelled with aluminium monostearate for depot therapy is claimed to give better results than the implantation of pellets.[59]

In the second part of his article, Mr. Robinson will discuss pellagra, pyridoxine and amino-acid metabolism, biological acetylation, biological formylation, biopterin, and various aspects of vitamin B_{12}.

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THE VACUUM CONTACT PLATE METHOD OF FRUIT DEHYDRATION—2

By Alan E. Joyce

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In the first part of this article last month Mr. Joyce discussed the principles of fruit preservation and the effects of scalding on fruit. The drying of fruit is discussed in this concluding part, in which hot air drying is compared with the vacuum contact plate dehydration method which is being studied at Aberdeen with promising results.

DRYING STUDIES:

(a) Hot air drying

The conventional method of blowing hot air over the material has severe limitations. If the drying time is to be economic, it must be short, and hence the portions of material must have very little thickness and large surface area for free evaporation; these conditions are generally obtained by the use of slices for hard fruit and rupturing the epidermis for drupes. In hot air dehydration the outermost region dries quickly, forming a barrier to the diffusion of moisture from the centre of the tissue, the rate of evaporation decreases considerably with a consequent reduction in the cooling effect due to the latent heat of vaporisation of water, and the temperature of the tissue soon rises to that of the hot air, which is normally about 70°C. Prolonged heating at this temperature results in the concentration of cell constituents to such a degree that there is a danger that their chemical interaction[9] will be stimulated, since dehydration is not sufficiently advanced to prevent the reactions. The higher the temperature of the fruit, the more readily do these reactions take place, and if allowed to continue they produce unacceptable flavours and destroy the natural colours.[10] These reactions may be considered as distinct from those which take place in the presence of intact enzymes, but they may none the less be catalysed. Under these conditions the drying time may be anything from 8 to 24 hr.

In spite of these drawbacks hot air dehydration has had some commercial success; sulphited pears and plums have been successfully dried to a moisture content of about 20% and sulphited apples to about 10%.[4] Hot air drying has given unsatisfactory results with blackcurrants, gooseberries, raspberries and strawberries. Blackcurrants and gooseberries, even when the outer skin has been ruptured by scalding, still provide a barrier to moisture loss by diffusion. Raspberries and strawberries, once scalded, lose juice very rapidly, and if air drying is carried out on mesh or slatted trays the final product is of poor quality. Moreover, all four fruits are very susceptible to heat damage, and in some cases (*e.g.* blackcurrants) a product which is almost inedible may result, and in others the flavour may be altered to a very large extent. Tomatoes suffer from a further disadvantage in that their colour is due to a group of pigments which are not only particularly sensitive to oxygen but whose breakdown products are powerful sources of off-flavours and smells.[11]

(b) Vacuum contact plate dehydration

When water is removed by distillation at reduced pressures, there is also rapid cooling owing to loss of latent heat, and freezing ensues. If drying is to continue, either the vacuum must be increased to such an extent that the ice formed in the material will sublime, *i.e.* vac-ice drying, or the latent heat loss must be replaced from some external source. Vac-ice drying is expensive, since the vacuum pumping system must be capable of attaining a high vacuum and the ice which is sublimed must be trapped. The second alternative may be achieved by placing the undried material in contact with a source of heat. The region in immediate contact with the heating source has its latent heat loss compensated for, and dries rapidly with a honeycomb-like texture which is a very poor conductor of heat and prevents heat passing to the undried frozen regions. If the material is heated from both above and below, this partly overcomes the difficulty, and if the two heating surfaces are gradually brought together by mechanical means at a rate such that the honeycomb region is always collapsed before becoming brittle, so bringing the wet region into close contact with the heating surfaces, the material may be dried throughout.

The term "Vacuum Contact Plate Dehydration" has been applied to this process, and a plant capable of carrying it out was built in Denmark in 1948 and brought to Aberdeen. It consists of a large vacuum cabinet containing three banks of eight heating plates, through which may be circulated hot or cold water.[2] In the spaces between these plates are placed aluminium trays containing the material to be dried, each covered with an aluminium lid. These plates may be brought together over a distance of 2½ in. to ½ in. by a system of levers. Vacuum is achieved by the use of water and steam ejectors, thus removing the necessity for expensive moisture trapping necessary with oil pumps.

The dehydrated fruits resulting from vacuum contact plate dehydration are quite different from corresponding air dried material: they have a porous structure, reconstitute more readily, and retain flavour better. It is believed that the differences are largely due to

the method of water removal. In air drying, the outermost layer of cells dries, and their contents become concentrated and hygroscopic. They then absorb water from the layer of cells beneath, only to lose it to the hot external air. There is thus a diffusion gradient from wet inner cells to outer drier cells and so to the hot air. The product is leathery, shrunken and dense.

Although it has not actually been demonstrated, it is thought that in vacuum dehydration the moisture is distilled from the outermost layer of cells, leaving a honeycomb structure. This is collapsed under pressure, but sufficient channels are left for the vacuum to effect distillation of water from the next layer of frozen cells when heat reaches them from the heating plates. This process continues through the tissue, the water being distilled as each successive layer of cells thaws in turn, the rate being determined by the rate of heat transference to cells concerned, *i.e.* on the temperature of the circulating water and on rate of collapse of the tissue. This technique gives a crisp, porous product.

Studies with this equipment have been directed to finding drying conditions which give a good product with a maximum tray-loading and, in the course of these studies, it has become evident that the design can be improved for drying fruits. If the process is described step by step it will be possible to show where improvement in the plant is required.

Once the material has been trimmed and scalded, it is loaded on the trays at a rate of 2 lb./sq. ft., and pieces of rhubarb are placed round the perimeter of the fruit and in the centre to act as pillars, which prevent the lids from squeezing juice out of the fruit by their own weight and also allowing free space above the fruit for rapid movement of vapour. These trays are then placed between the heating plates, through which the water is circulated at 15°C., the cabinet is evacuated by the water ejectors to a pressure of 70 mm. Hg., and eventually to 3-4 mm. Hg. by the water and steam ejectors together.

In any plant tissue there is a large amount of air in intercellular spaces, and even after light scalding much of this air is still present. When the initial vacuum is applied, this air expands and passes into the free space around the fruit, often taking much juice with it. From a tray holding 60 lb. of fruit there is a considerable amount of air to be removed, and if the clearance between the lid and fruit is only $\frac{1}{2}$ in. or less, the air, if removed too rapidly from the fruit in the centre of the tray, can sweep the fruit at the edges of the tray off and into the cabinet because the tray has only a shallow rim. Thus the application of initial vacuum must be gradual. The temperature of the circulating water at this stage is maintained at 15°C. and the temperature of the scalded fruit falls towards this level.

For about the first hour of evaporation the moisture in the fruit obeys the saturation vapour pressure laws for a free water surface, so when the vacuum becomes coincident with the saturated vapour pressure of water at 15°C., *i.e.* within the pressure range of 10-17 mm. Hg., the fruit cools and eventually freezes because of the evaporation of water, and the rate at which evaporation continues is dependent on the rate at which the latent heat lost is returned to the fruit by the circulating water, which is now slowly heated. There are several critical factors here, and each must be considered in turn. If the rate of evaporation is too great, then the vapour from the fruit in the centre of the tray passes out with considerable force through a restricted space, and, in a similar manner to the intercellular air, sweeps the fruit off the tray. Therefore not only must the application of the vacuum over this second stage be gradual, but also the rate at which the latent heat is replaced. That is, the temperature of the circulating water must be gradually increased and the plate spacing remain at its maximum, for if plate closure were started, the rate of replacement of heat would be increased and the free space above the fruit further restricted.

Once plate closure is commenced, the rate of bringing together the heating surfaces must be carefully controlled. If this is done too quickly, juice is squeezed out of the fruit with a consequent loss in nutrients and flavours. If it is too slow, the dry region becomes brittle and is fractured: heat conductance is impeded, the drying time lengthened, and the material, on reconstitution, gives a rather soft, mushy product. (A similar effect is found in air drying when too drastic conditions are used in the initial stages, and case-hardening results, yielding a product which takes a long time to reconstitute and has an unpleasant texture.)

From these observations it is thought that a plant with a 4-5 in. plate spacing, and with the lid held to the upper heating surface, would give enough space above the fruit for the initial air and vapour removal and would allow the minimum pressure to be reached far more quickly than in the present plant without the "blowing" effect, and would also result in quicker freezing of the fruit.

It must be emphasised that allowing the fruit to freeze has so far proved essential for the best flavour and texture. On freezing, the juice, which always tends to seep out after scalding, is more readily retained in the tissues, so enhancing the flavour of the product, while the slow thawing, combined with the direct distillation of water from the plant cells and gradual collapsing of the dried portion under compression, gives a characteristic open, cellular, honeycomb texture to the product instead of the leathery, shrunken, dense texture of air-dried material.

Experiments were initially carried out with a view to preventing this freezing, as this seemed desirable both from the economic and logical viewpoints. The attaining of pressures lower than 30 mm. Hg. is achieved by the use of steam ejectors which have a fairly heavy

steam consumption, and so it seemed to be more logical to increase the temperature of the circulating water and hence the temperature of the fruit, with the result that evaporation commenced at 40°C. and 55 mm. Hg., this pressure being attained by water ejectors only. The steam ejectors are necessary at a later stage, since it is only for about 1 hr. after evaporation has commenced that the water in the tissue obeys the saturation vapour pressure laws applying to pure water: as drying progresses the vapour pressure of water in the fruit decreases, and a greater degree of vacuum (*i.e.* lower absolute pressure in the cabinet) is necessary for evaporation to continue. It was found that the flavour and porous texture of the product were both inferior to those of fruit dried with a lower starting temperature, and approached those of air-dried fruit, presumably because the delicate flavours characteristic of home-grown fruits are volatile, and the greater the proportion of drying under low temperature conditions the better their retention and the more acceptable the product. Although there was a significant saving in steam, the drying time was only very slightly shorter.

In the technique at present used, the temperature of the circulating water in the heating plates is raised from 15-80°C. over 1½ hr. and maintained at 80°C. for 1½-3 hr., then allowed to cool to 63°C. Drying is complete when the temperature of the fruit becomes coincident with that of the circulating water at 62-65°C. and has remained so for approximately ½ hr. The total drying time for this process varies from 4-6 hr., compared with from 8-24 hr. for air drying, and the fruit is dried at much lower temperatures. The time for which it is above 30°C. varies according to the type of fruit, its condition, the technique employed and the final moisture content required. The longest period is 3½ hr., the shortest 1½ hr. The period for which it is over 50°C. is less than 2 hr., and the time between 60 and 63°C. is ½ hr. to give a final moisture content of 4·5-6%, and one hour for a final moisture content of 2·5-4·5%. In Fig. 1 are shown typical drying curves for the present method and for the previous method which has now been discarded. Times for air drying would be 4-8 hr. between 30 and 50°C., and might be as much as 14 hr. at 70°C. for final moisture contents of 20% for plums and pears and 8% for apples.

Vacuum contact plate drying may tend to be uneven, probably due to poor thermal contact between trays and heating plate. This could be overcome by expensive engineering to obtain rigid trays and a milled surface to the heating plates. A possible alternative may be to dry on aluminium foil, which would take up the surface variations of the heating plates. This might considerably shorten the drying time.

The present process also suffers the inevitable disadvantages of batch methods. A continuous process of drying on a conveyor *in vacuo* has become a commercial proposition for viscous liquids, and it might be possible for the "double contact" principle to be applied to solids such as fruit in a continuous process involving converging bands, so eliminating the loading and unloading times and reducing labour. Such a technique might also avoid the difficulties arising from poor contact between trays and heating plates.

(c) Reconstitution and quality

Before discussing the culinary aspects of the vacuum dehydrated fruit it must first be appreciated that the type of season affects the quality of fresh fruit, and it is bound similarly to affect the quality of the dried fruit, but under certain conditions does so even more than might be expected. For instance, a wet season tends to produce fruit which drips profusely after scalding and is devoid of flavour.

Material produced by the vacuum plant has been extensively tasted by a Ministry panel and by an independent panel. From these taste panel studies, and from experiments on replacing fresh fruit by the dehydrated products, in conventional domestic recipes, it has been possible to demonstrate the wide variety of ways in which the dehydrated fruit can be used.

The colour in most British fruits is due to water-soluble pigments which, in the case of the four commercially important soft fruits, diffuse very rapidly out of the tissue in the reconstituting water. Their flavour is also water-soluble and in certain instances very volatile, and during cooking is lost in the steam. It is obvious, therefore, that the quantity of water for reconstitution must be kept at an absolute minimum, and it has been found that 1 gill for 1 oz. is sufficient for most fruits if the fruit is kept immersed in the water by means of a light weight. This applies also to certain tropical fruits.

Vacuum dehydrated fruit, due largely to its porous nature, reconstitutes rapidly. The degree of reconstitution varies considerably, and for blackcurrants is 5 : 1, *i.e.* the same as the drying ratio. For strawberries, however, it is much less than the drying ratio. The best method for reconstitution of most of the fruits which have so far been studied is the addition of hot water, allowing to soak for 2 hr., followed by bringing to the boil, sweetening and simmering for 5 min. for blackcurrants, gooseberries, plums, raspberries, and for 10 min. in the case of apples. In many cases an acceptable product can be obtained by merely dropping the fruit into boiling water, simmering until tender and sweetening to taste.

In the case of pears, peaches and strawberries, a rather different technique has been employed in order to retain as much of the flavour and colour in the fruit as possible. After 2 hr. soaking, surplus liquid from reconstitution is drained from the fruit, converted to a light syrup, brought to the boil, the fruit added and simmered gently. Strawberries are not normally eaten cooked, and cooked strawberries are not generally appreciated. Dehydrated strawberries, reconstituted and cooked, then mixed with milk

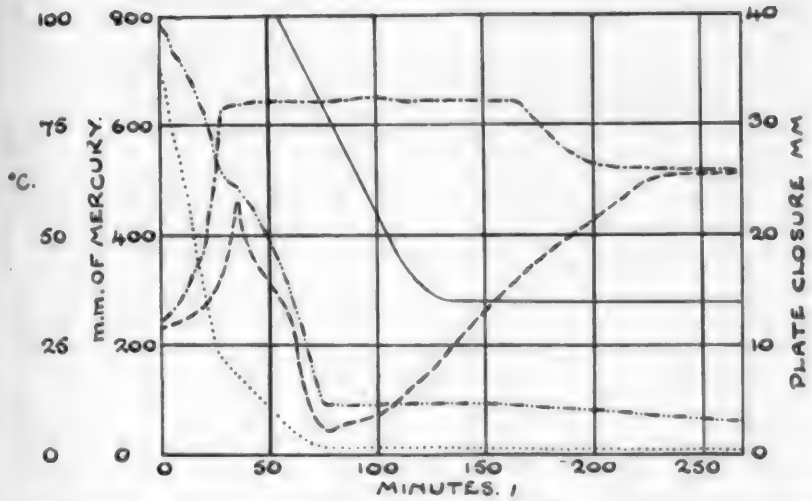
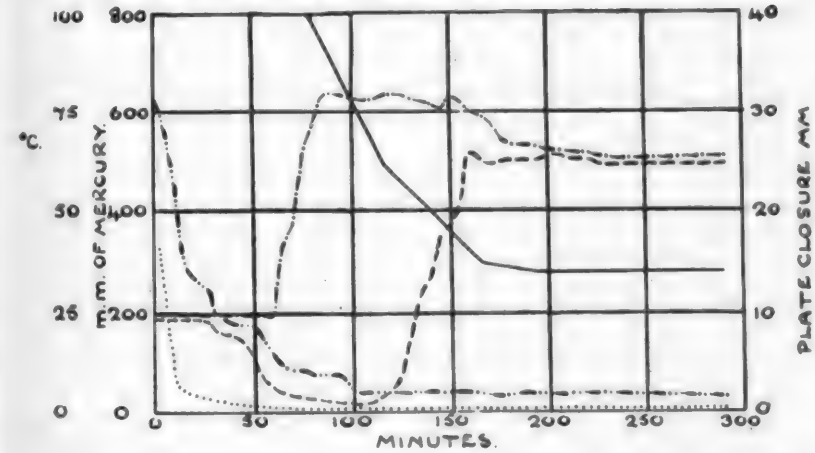


Fig. 1. (above) Dehydration log showing the drying curve of the now discarded technique. (below) Drying curve of the technique now employed.

Explanation of the Symbols Employed.

1. **Plate closure:** ————
2. **Temperature of circulating water:** — • — • —
3. **Temperature of the fruit:** — — — —
4. **Operating vacuum:** — •• — •• —
5. **Boiling point of water at operating vacuum:** •••••



custard, make none the less a very pleasant sweet.

Pineapple may be reconstituted in two ways. It may either be soaked for 2 hr. in the minimum quantity of water, the surplus liquid being treated in the same way as for strawberry, and simmered until tender, or it may be soaked in the minimum of water for 12 hr. and eaten without any cooking, the surplus liquid being sweetened to a syrup and added to the fruit.

The banana product is disappointing on reconstitution. It may, however, be powdered and used dry for flavouring cakes and pastries.

Apples have shown several interesting features. The quality of the fresh apple will affect considerably the culinary quality of the reconstituted fruit. With apples and plums, more perhaps than with any other fruit, the variety is of great importance. So far Newton Wonder and Bramley have been found to be most suitable varieties for dehydration. The scalding of apples is critical, as was shown in Table I, and it may be very uneven unless the apples are carefully graded, even within the variety. It is not uncommon to find different parts of the same apple reacting in different ways. One half of the ring may be quite soft while the other half is still hard. As a result, tough pieces of apple are found in the reconstituted material and, therefore, even ripeness is essential for a good product.

Variety studies with blackcurrants, raspberries and strawberries have been somewhat restricted. The varieties of blackcurrant that have been successfully employed are Mendip Cross, Boskoop Giant, Baldwin, Amos Black and Seabrooks Black. Raspberry varieties: New Zealand Lloyd George, Norfolk Giant, Malling Exploit, Enterprise, Jewel and Promise have all been dried successfully, with a slight preference for the Lloyd George. The strawberry varieties Huxley and Auchincruive Climax have been dehydrated; a good quality product is dependent on having ripe fresh fruit with even colouring. Of the fruits grown in the U.K., blackcurrants are a very good source of vitamin C and gooseberries and strawberries are moderately good sources. Since blackcurrant had never been dried with satisfactory retention of the ascorbic acid, its use as an out-of-season source of vitamin C had been confined to therapeutic concentrates. It has been shown that the destruction of ascorbic acid on vacuum dehydration is very small. Fresh blackcurrants contain approximately 220 mg. per 4 oz. portion, and the dehydrated material 200 mg. for an equivalent quantity.

Several gooseberry varieties have been experimented with, and considerable differences have been found. Studies are being continued.

The following plum varieties have been dehydrated: Czar, Pershore Yellow Egg, Warwickshire Drooper, Victoria, Monarch and Blaisdon Red, and an unknown variety of greengage. The greengage and Warwickshire Drooper have a slightly more pronounced flavour than the other varieties.

In fruits where the flavour is very volatile, such as banana and pear, vacuum drying does result in a rather noticeable loss of flavour, and bananas in different stages of yellow ripeness are not

capable of differentiation after dehydration. Such flavour changes as take place in other fruit are, in general, slight: it is not yet known whether these changes are due to the effects of high temperature, vacuum, cell disorganisation during scalding or drying, or to combinations of these various factors.

Most of the fruits may be used to replace the fresh counterpart, and when suitable quantities of sugar and water are added can make a very pleasant jam. Experiments have been carried out on the vacuum dehydration of various fruit and sugar mixtures. Fruits scalded, then suitably sweetened with sugar and dried ready for immediate use, have a less pleasant flavour than the fruit dried by itself, reconstituted, cooked and sweetened. Fruit scalded, then mixed with the appropriate quantity of sugar for jam, and dried gives a brittle product which may be compressed into blocks which, on boiling with water for 5 min., form a jam.

This jam-fruit mixture results in 1/5th saving of both bulk and weight, while the material is very much less hygroscopic than the fruit itself. Fruit ground to powder, mixed with cornflour and sugar, may be reconstituted and cooked to produce a very acceptable strained food.

(d) Storage life

The fruit so far examined has shown a storage life in nitrogen gas pack of 18 months to 2 years under temperate conditions (18°C.) and 5 months at 37°C. which may be regarded as a severe tropical test. These values have been obtained with fruit with moisture contents in the region of 4-5%.

No sulphite was present except in apples, plums and peaches, where about 50 p.p.m. resulted from the sulphite spraying prior to scalding to prevent enzymic browning of the cut surfaces. The relatively long storage life without sulphite is attributed to the low moisture contents attained with the vacuum contact plate process.

Potentialities of vacuum dried fruit

By using a dehydration method based on the distillation of water at reduced pressures it is possible to increase the number of fruits which may be successfully dehydrated.

In the one instance so far studied, the retention of ascorbic acid has been high. The quality of the reconstituted product is sufficiently good to enable them to replace fresh fruit in most of its culinary uses, and also to compare favourably with canned and quick frozen material. The long storage life of the product is encouraging for domestic use and also suggests the possibility of its use in prepared foods or as a raw material for the production of strained food.

Difficulty is always experienced in storing fresh material with short harvesting seasons until the plant is able to process it. If the technical difficulties of production in quantity could be overcome, for example, by evolving a continuous process, and the costs kept low, the vacuum contact method may well have widespread applications.

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(*Concluded from page* 65)

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The Confectionery Industry

(*Concluded from page* 62)

the trading point of view, manufacturers had great difficulty in meeting the demand, particularly for the gift-box trade for which chocolates are usually preferred.

The experience of last summer will no doubt make manufacturers consider the provision of further cool storage facilities for finished chocolates. Naturally, they will wish to satisfy themselves that prolonged cool storage will not lead to a deterioration in the bouquet of the couverture or in the quality and texture of any of the centres.

Humidity control of finished stock rooms is less important since many firms protect the carton or box with an overall moisture-proof film wrap. Thus the biggest problems of prolonged storage is the development of bloom through excessive temperature. Since a fluctuating temperature is much worse than a steady one, the main requirement of air conditioning is to ensure a stable temperature not greater than perhaps 68°F.

Owing to their varied climate, American confectionery manufacturers have developed cool storage to a high degree, but a great number of factors which affect quality control will have to be examined before the method can be universally adopted in this country.

Antioxidant Spices

The antioxidant properties of 32 spices were studied by J. R. Chipault, *et al.* (*Food Res.*, 1955, **20** (5), 443) in a simple oil-in-water emulsion system. All spices protected the emulsion against oxygen absorption. In most cases the spices were more effective in the emulsions than in plain lard or baked pie crusts, but the order of effectiveness was different for the different substrates. Cloves were extremely effective in preventing oxidation of the emulsions. Other spices with antioxidant indexes greater than 5 were allspice, cardamon, cassia, cinnamon, ginger, mace, nutmeg, oregano, black pepper, white pepper, rosemary, sage, savory, thyme and turmeric.

Advances in Food Technology

FRUIT PRODUCTS

Processing Fruit Jelly

Commercial apple jellies have been manufactured using either the atmospheric or the vacuum method for evaporation of water. Atmospheric concentration causes flavour loss, a browning reaction and heated or scorched flavours. Vacuum evaporation eliminates browning and the heated flavour but the flavouring components are vaporised. A new method of processing has been evolved in which a portion of the fruit juice is not subjected to boiling temperatures. The fruit juice for a given batch was divided into two or three portions, only one of which was boiled to evaporate the required amount of water. The sugar and pectin were dissolved in another portion at a relatively low temperature. This and a fresh juice portion, when used, were combined with the concentrated portion and the mix was heated to the prescribed filling temperature. A statistical design known as a "Balanced Incomplete Randomised Block Arrangement" was used for this research. The experimental process treatments produced an apple jelly said to be definitely superior in quality to that produced by the simulated commercial process control.—W. J. Hoover, A. I. Nelson and M. P. Steinberg, *Food Tech.*, 1955, **9** (8), 377.

SMOKED MEATS

Alleged Toxicity

In order to test an allegation that strongly smoked meat may have a toxic effect on human beings, the Institute for Veterinary Nutrition Research at Giessen, Germany, has carried out an investigation based on the long-established fact that, after an injection of phenyl hydrazine, the red blood cells of warm-blooded animals contain certain light-refracting spherical corpuscles consisting of precipitated protein. This test, which has also been successfully used for testing food colours, was applied to mice fed on heavily smoked bacon and ham. It was found that none of the mice showed a toxic change in their blood cells. It is therefore concluded that smoked meat is not prejudicial to human health.—H. Keller and H. H. Heidtmann, *Die Fleischwirtschaft*, 1955, **7**, 502.

FISH

Mechanised Canning

Sardines and other fish must be canned in as fresh a condition as possible, a fact which has hitherto precluded the application of highly mechanised methods for fish canning. But such methods could be applied if the factory input of large catches could be spread by short-term or long-term cold storage, it being essential that a temperature of +2°C. is reached very rapidly so that microbic and diastatic action is effectively inhibited. This can be done by using a new patented system of brine tanks with forced circulation, where the fish are kept safely to provide a regular input flow for a continuous, highly mechanised working process on production-line principles. This process (Toquer system) includes all the stages of fish processing, including cutting, evisceration, washing, infra-red baking and canning proper, all within a period of 40 to 45 min., so that the canned fish have a degree of freshness hitherto unknown. Among other advantages ascribed to this system, which is already in regular use, are important savings in labour and materials, and greatly improved working conditions.—J. Toquer, *La Revue de la Conserve de France et de l'Union Française*, 1955, **8**, 49.

COFFEE

Sugar Content

There has been some diversity of opinion regarding the sugars of coffee. Results obtained in a preliminary study of the total hydrolysable sugars in green and roasted coffee showed that, on hydrolysis, the total reducing sugars amount to 30%, out of which only 4% is extracted in the brew. Chromotographic studies confirmed the presence in coffee of glucose, fructose, sucrose, arabinose, galactose and mannose.—C. P. Natarajan, *et al.*, *J. Indian Chem. Soc.*, 1955, **18** (1), 9.

TOMATOES

Consistency of Juice

Factors affecting the viscosity or consistency of tomato juice were studied by Cornell University workers in a pilot plant simulating commercial conditions. Microscopic studies showed that the number and shape of suspended particles were chiefly responsible for gross viscosity.

The finisher was shown to be important in controlling viscosity. With a paddle-type finisher, adjustment of the speed of the paddle provides a wide range in gross viscosity, regardless of preheating temperature. The preheater softens the chopped tomatoes before finishing and preserves the pectin in the serum.

The tomato is composed mainly of large, thin-walled, nearly spherical cells loosely held together with pectin. The more cell particles, the greater the consistency of the juice. However, the shape of the cell fragments is also important. Elongated particles have a greater effect on viscosity than spherical particles. Running the finisher at high speed incorporates large amounts of suspended material in the juice, the particles tend to be elongated and the juice has a high gross viscosity. *Food Pack.*, 1955, **36** (10), 16.

SWEET POTATOES

Dehydration Studies

In investigations on sweet potato dehydration the effects of conditions of processing and of selected commercial varieties on chemical properties were determined. The changes in chemical composition of raw sweet potatoes (unit 1 Porto Rico variety) during processing—without preheating, with preheating at 130° to 140°F. for 30 to 40 min. and with preheating at 165° F. for 10 to 20 min. in combination with drying at initial temperatures (dry bulb) of 200°, 175° and 150°F.—do not indicate any one combination of conditions to be materially superior to any other combination. Chemical analyses of freshly dehydrated sweet potatoes indicate that satisfactory products could be made by several combinations of the processes investigated. The changes in chemical composition of selected, commercial varieties of raw sweet potatoes during processing indicate no particular superiority among the yellow moist-type varieties. If a freshly dehydrated product having the highest possible carotene content is desired, the Goldrush variety is superior.—J. C. Arthur and T. A. McLemore, *Ag. and Food Chem.*, 1955, **3** (9), 782.

SUGAR

Diffusion Extraction

A continuous diffusion process for the extraction of sugar from sugar cane differs from mechanical methods now used in that it is basically a chemical procedure in which osmosis-dialysis plays an important part. The advantage is that 97% or more of the juice is extracted at a purity of from 2 to 3 points higher than that resulting from milling practice.

A continuously operating cutter slices the cane into uniformly sized pieces which are suspended in a portion of the extracted juice and injected into the bottom of the tower. A central shaft is fitted with a series of slowly rotating helical scrolls, the flights of which are interrupted periodically to accommodate fixed agitators (called arrestors) that extend inwardly from the shell and which serve to keep the suspended mass of cane pieces in motion in intimate contact with the extracting liquid. The extraction medium, hot water, is supplied to the top of the diffuser, and the amount of water is controlled by the weight of cut cane entering the system. The temperature of the water is raised to a range of 190° to 210°F. with steam. After withdrawing, part of the juice is recycled through a feed tank to carry the fresh cane chips, and the rest goes to the factory. The recycled juice is heated before mixing with the cut cane to maintain a uniformly high temperature in the tower.

The process is owned by National Cylinder Gas Co., who are licensing it to sugar refiners.—*Chem. and Eng. News*, 1955, **33** (16), 1676.

BREAD

Temperature, Air Velocity and Rate of Freezing

Freezer temperature was found to be the variable with the greatest effect on freezing rate of wrapped bread. With unwrapped bread, air velocity and position of the loaf in the air blast were factors of major importance. The most rapid method of freezing bread in the present experiments was by means of a high-velocity, low-temperature blast of air at right angles to the long dimension of an unwrapped loaf. Individual loaves could be frozen in less than 30 min. by this method, and no significant loss of moisture occurred.

The wrapper on a loaf of bread slowed the rate of freezing about as much as using freezer temperature 10°F. higher. Wrapped bread packed in pasteboard cartons froze several times more slowly than individual loaves under similar freezer conditions.

Whole wheat bread froze at the same rate as white bread despite a substantial difference in loaf density. Raisin bread froze at a lower temperature than white bread, and sour French bread at a higher temperature, as would be expected from the differences in composition.—J. W. Pence, *et al., Food Tech.*, 1955, **9** (7), 342.

FROZEN FISH

Glazing and Storage Qualities

Recognising the importance of glazing in improving the storage life of fish, suggestions have been made for glazing fish which are to be subsequently stored at −18°C. (0°F.). For storing the fish for 4 to 5 months, the glaze should increase their weight by 4·5 to 5%, and when storing up to 8 or 10 months the glaze should be 7 to 8% of the weight of fish.—A. Pisskareff, *Kholodilnaya Technica* (Moscow), 1954. **31** (3), 51. Summary in *Kältechnik*, 1955, **7** (10), 86.

MEAT

Digestibility Studies

The German Federal Meat Research Institute at Kulmbach has confirmed that there is a definite inverse relationship between digestibility and the content of connective tissue in meat, so much so that the one can be exactly determined by the other. Whilst the presence of sinews is not a major factor, peptide decomposition has an important bearing on digestibility. Fat does not affect the solubility of meat in pepsin-hydrochloric acid, but the peptide decomposition is markedly inhibited. The proteolysis of meat is accelerated by kitchen salt in low concentration, but greatly impeded by salts in higher concentrations. Cooking hardly affects the solubility of meat in pepsin-hydrochloric acid; but it causes a considerable reduction in peptide decomposition.—R. Hamm, *Die Fleischwirtschaft*, 1955, **7**, 504.

WINE

Calcium Tolerance of Sherry

Laboratory experiments were made to determine the equilibrium conditions of calcium ion in sherry at various *p*H values. The knowledge gained from these experiments was successfully applied during plant operations. It was found that when sherries were adjusted to a *p*H of 3·50-3·70, depending on calcium content, instability was prevented in all plant blends.—R. De Soto and H. Warketin, *Food Res.*, 1955, **20** (4), 301.

Italian Food Engineering

THE natural advantages of Italy for the production of fruit and vegetable juices, in particular pasteurised tomato juice and concentrated lemon juice, have influenced the development of several interesting machines. An outstanding example seen at the Parma Food and Packaging Exhibition was the Betuzzi (Parma) juice extraction plant, designed principally for tomato juice production but also suitable for apricots, peaches, pears, grapes, citrus fruits, etc.

In this machine part of the pulp after the juice has been extracted is eliminated, while the expressed juice is treated in a *Turbine* centrifugal machine. A distinctive feature of the latter is the intermittent, automatic discharge of almost dry residue. The extracted juice flows into two containers where salt, sugar, citric acid, etc., are added. The juice is now treated by a de-aerator-homogeniser and by Betuzzi's *lamporizzatore*. In this apparatus enzymatic stabilisation and pasteurisation are achieved by adjustable means. Bottling and canning machines are also provided by Betuzzi, with capacities of 1,000, 1,500 and 2,000 litres per hr.

After pasteurisation the juice is often preserved by SO_2 or formic acid, and it is often necessary to replace the former by the latter according to the requirements of different countries. To meet this need, Betuzzi have developed a desulphurisation plant.

Other plant for the concentration of tomato juice was exhibited by Luciani (Parma). Complete plant for the preparation of fruit purée, marmalade, jams, and candies and can-making machinery were also displayed by this company.

A rapid thermo-filling synchronised tube filling apparatus, exhibited by Migliavacca (Parma), was said to provide perfect sterilisation of the product, constant temperature, a 60% saving in labour and low steam consumption. Its output is about 15 cwt. per hr.

Cherry stoning machines, intended principally for candied fruit manufacture, were shown by Tomelleri (Verona), while other machines for stoning cherries, plums and apricots were displayed by Dalle Vacche, Ettore (Ravenna).

Complete plant for the automatic manufacture of cans, circular and guillotine shearing machines, sterilising and drying furnaces, filling machines, preheaters for peeled tomatoes and automatic presses were among the equipment displayed by Fabbrica Macchine Industriali (Naples).

A labelling machine, claimed to have an output of 1,200 per hr., was shown by De Santis Fratelli (Salerno).

The *Star* 90, a new tube-filling machine, was exhibited by Rossi (Parma). Filling operations range from 3,000 to 6,000 per hr., and the machine can be pre-set for any amount between 50 and 300 g. The makers claim that tubes of any size up to 50 mm. dia. and 200 mm. height can be used, while special models for larger tubes are available on demand. A choice of four different types of folding is available by means of a special device, and the tubes can be checked and extracted during the operation. Several auxiliary pieces of equipment were also displayed, including an automatic tube-feeding device (for use when the filling operations exceed 3,000 per hr.), a photo-electric cell for the automatic centring of marks, a tube dusting blower, a device for tightening screw-caps, a numbering and marking device and a feed hopper for the product (with or without mixer and electric heating).

Brilliantly coloured aluminium containers for ice-creams, jams and marmalade, honey, frozen foods and synthetic creams were shown by the Tubettificio Ligure (Como) in sizes ranging from 15 to 100 c.c. It is claimed that the sealing cover ensures complete protection of the product and easy opening. The same company exhibited collapsible tubes with a patented sealing device.

Successful Salesmanship

UNDER equal conditions the English salesman has no superior, according to the author of a book* designed to define the sales manager's assignment and to guide him in his work. His superiority, however, depends upon that qualification "under equal conditions." Since 1939, declares Mr. Smith, the new recruit to the sales staff has been trained in an entirely false atmosphere and is in no condition to meet the shock when a buyer's market is in full operation.

Drawing upon his years of successful experience in building up the sales for a nationally known company, the author describes the necessary steps in the building up of a sales organisation for selling direct to the retailer. Starting with a discussion on policy, he deals with the whole subject from the recruitment and training of salesmen and the surveying and allocation of territories to the setting up of a sales research section and the establishment of a free and satisfactory liaison between sales and production departments. Chapters are included on selling costs and salesmen's remuneration, the value of demonstration and the economical use of time and effort.

The author insists that while there are limitless variations in the process of selling, the principle on which all these differing ideas are based remains constant, so that fundamental selling practices are the same. The most fundamental principle, he avers, is that the success of a sales department depends upon the extent and sincerity of the goodwill developed between a company, its staff, its customers and its sales manager. A sales manager's business is the building of goodwill, and until this is accomplished all other effort is in vain.

* *Creating Goodwill: the Sales Manager's Assignment*, by R. B. Smith. Macdonald and Evans, Ltd. London, 1955. Pp. 143. 12s. 6d. net.

Machinery and Equipment

ELECTRONIC THERMOSTAT

An electronic thermostat, said to be capable of detecting temperature variations of the order of ±0.1°C. about any scale setting, on ranges of up to 100°C., has been developed by Fielden Electronics Ltd. For ranges up to 500°C., an accuracy of ±0.1% is obtained.

The instrument is intended for both laboratory and industrial applications where long-term calibration accuracy is essential. Where no indication or record is required, it can be used to give warning of deviation from a required temperature or, in those applications for which on/off control is satisfactory, to control the temperature at a pre-set level.

The electronic equipment is housed in a small die-cast aluminium case for wall or panel mounting and can be installed by unskilled personnel. A resistance bulb, with its pocket, is inserted at the temperature measuring point and connected by copper cable to the electronic unit. The calibrated dial on the front is set by hand and indicates the temperature at which the operating point is controlled. A green indicating lamp lights when the temperature falls below the control level and an amber one when it is above.

The Fielden electronic thermostat for applications where long-term calibration accuracy is necessary.

SCREW-CAPPING MACHINE

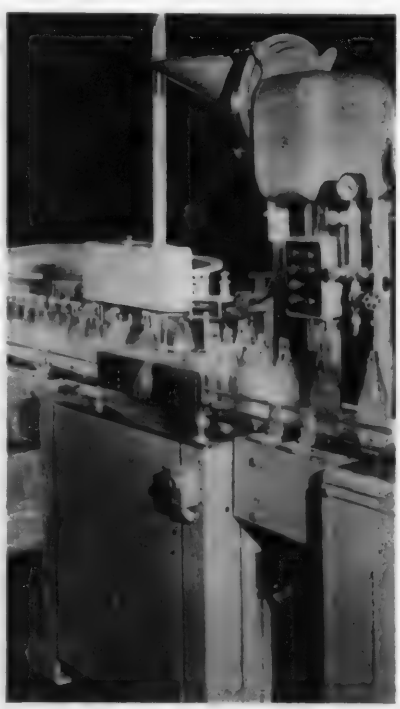
A machine designed to handle the new screw closure used by the soft drinks trade, as well as other types of metal and plastic caps, with a maximum speed of 130 per min., has been introduced by Autopack Ltd. It is claimed that setting for different sizes of container or cap can be carried out very quickly, while the simple design of the machine obviates the need for maintenance by skilled engineers, or the continuous attendance of an operator.

Safety devices have been incorporated at the three crucial points (the bottle feed, the main rotor, and the cap feed) to stop the machine in the event of faulty caps or bottles coming through. Three different coloured signal lights indicate the section in which trouble has occurred.

The containers are fed into a continuously moving rotor which takes them beneath the cap applier and tightening wheels. Full control is maintained over both the container and closure until the cap is screwed to the required tightness. Simple clutch adjustment alters the tension of the cap-tightening wheels so that while breakage can be obviated on light plastic caps, metal caps can be screwed down tightly.

The caps are fed from an unscrambling hopper and delivered to the cap-applier the correct way up—should a cap come through upside down, the machine automatically cuts out.

All working parts are fully guarded, and all parts coming in contact with liquid are chrome plated. The machine is so designed that it will work under existing slatt-type metal conveyors, or can be supplied with its own conveyors, and simple adjustments in the feed of the machine enable it to be lined up easily with filling and labelling machines.



Autopack's new screw capping machine on a bottling line at the C.W.S. aerated water factory in Edmonton.

STEAM GENERATOR

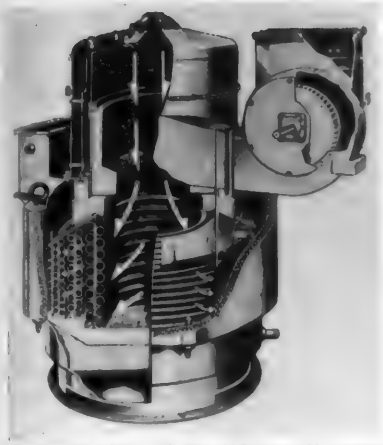
An American steam generator, said to make steam only as and when needed, is to be made and sold in the U.K. by J. Stone and Co. (Deptford) Ltd., under licence from the Vapor International Corporation of Chicago. The admission of fuel to the burner is automatically regulated to correspond with the demand and as determined by pre-set controls. It is claimed that the required head of steam can be raised in 2 min. and that there are no fires to "bank up for the night."

The *Vapor* steam generator has a low installation cost. No special boiler house, massive foundations or chimney stack are needed as the weight is about one quarter and the size one fifth of conventional boilers of the same rating.

Essentially the generator is a compact, forced circulation water-tube boiler with several sets of coils nested and connected in series to form a single coil. Feed water passes through the coil once only. It is not re-circulated and there are no drums, headers or internal reservoirs. Fuel is admitted to the burner in the proportion required to heat the amount of water passing through the coil at any one moment and so generate a controlled steam pressure at the coil outlet.

Heat is released in the pressurised combustion chamber at a rate from 10 to 20 times greater than that of conventional boiler practice. High turbulence forces the hot gases to scrub the coil surfaces and wipe off any insulating film of relatively cool gas.

The combustion air is pre-heated in an air jacket surrounding the upper part of the fire pot. It is delivered under forced draught to the burner where it mixes with the atomised fuel oil. The hot combustion gases are driven down and across the nested coils which are staggered to ensure maximum contact. The fire is adjusted to evaporate about 90% of the feed water admitted to the coils. The unevaporated water travels at high speed



Sectional view of the "Vapor" steam generator.

carrying scale-forming sludge into a steam separator. Here it settles to the sump, and steam of over 99% quality passes through the coil outlet. The thermal efficiency of the generator is from 78% to 82%, throughout the whole modulating range.

Protection against breakdown is provided by the servo control which shuts down the unit completely if the water supply falls below a safe minimum. A temperature limit control safeguards the coils from the possibility of abnormally high steam temperature due to low water flow. It should be noted, however, that due to the relatively small mass of water in the coils, even under full operating conditions, there is at no time any danger of explosion. In the event of flame failure the water flow is automatically checked either by a pressure switch, or stack switch.

Torque-arm shaft-mounted speed reducer on line shaft drive. Two new sizes of these speed reducers have been introduced.

SEAMLESS PIPE FITTINGS

A new range of seamless, stainless steel fittings—designed to cut the cost of pipe welding—is being marketed by the Talbot Stead Tube Co. Ltd., under the name *Forjend*. The range comprises long radius standard weight elbows and return bends and standard weight equal tees, reducers and caps, and flanges in accordance with British and American standards. The material is made to American standards applicable to stainless steels. It is said that the fittings greatly facilitate laying out, lining up and welding.

pH INSTRUMENTS

*p*H instruments recently introduced by Electrofact Ltd. include three laboratory type models. The 4 lb. battery-operated meter has an accuracy of $>$ 0·2 *p*H and a reproducibility of $>$ 0·1 *p*H. The high-precision instrument is said to have the widest of *p*H and millivolt functions and to have been designed to meet the most exacting research requirements. A general purpose instrument is offered providing a full range of *p*H and millivolt measurements with temperature compensation from 0-100°C. This model is A.C. mains operated and is stabilised against both voltage and frequency fluctuations in the supply.

A feature of the precision laboratory instrument and of the complete range of industrial *p*H recorders is that they work on the null balance principle. A.C. amplification has been selected for these models and the circuits used eliminate the drift inherent in the more conventionally used D.C. amplifiers. The company also supply industrial recorder-controllers suitable for both electric and pneumatic systems.

Electrofact Ltd. is a subsidiary of a Dutch company of the same name.

A section of the squash factory of Clayton Bros., where borosilicate glass pipeline supplied by Q.V.F. is extensively used. It is especially suitable in the soft drinks industry since it can be cleaned without dismantling and gives visual control of the process.

"TORQUE-ARMS"

Two new sizes of *Torque-Arm*, Nos. 5 and 6, have been introduced by J. H. Fenner which widen the range to 30 h.p. drives. Fenners say that hanging the speed reducer on the shaft itself was unknown in this country until they introduced the *Torque-Arm* units a year ago. The full range of these shaft mounted speed reducers, including the new sizes, is described in a new brochure.

News Digest

Food "Codes of Practice" Criticised

A PROPOSAL that the food standards committee should be invited to review all codes of practice on the manufacture of food has been put to Mr. Heathcoat Amory, the Minister of Agriculture and Food, by the County Councils' Association.

They say that food standards are of little value to food and drugs authorities unless the standard of composition or a minimum standard of composition can be determined analytically. They point out that if they can be so determined and warrant publication, food standards should be included in statutory orders which are enforceable by food and drugs authorities and not in codes of practice which have no legal standing.

Meat and fish pastes. Referring to standards for meat and fish pastes, the association say that certain conditions should be imposed.

In the case where a single variety of meat or fish is named—such as ham paste, crab paste—no other variety of meat or fish should be used.

So far as named mixtures are concerned they say the names of the varieties and the proportions in which they are used should be required to be declared on the label, or, alternatively, that the minimum proportions for each of the several varieties should be prescribed by a Food Standards Order.

The association's decisions were made following complaints by Staffordshire's county analyst about "several unsatisfactory aspects" on the law of labelling and composition of food.

A report from the county council said that the composition of these foods was subject to the relative Food Standards Orders which laid down certain percentages of meat and fish. But they did not come under the provisions of the Labelling of Food Order, which would require their labels to carry lists of ingredients in the order in which they were used in the preparation of the articles.

The report continued: "Owing to the natural variation in composition of named meats and fish there is some difficulty in calculating accurately the meat content from the usual analytical data, and, unfortunately, the Codes of Practice agreed between the Ministry of Food and the Food Manufacturers' Federation relative to meat and fish pastes are of such a nature as to make it practically impossible to estimate the meat and fish content of many of these articles with any degree of accuracy. This being so, the relative Food Standards Orders are practically impossible to enforce.

Labels. "Another feature of the Codes which appears to be entirely against the public interest is that an apparently insignificant difference in the wording of labels can have widely different meanings, *e.g.* 'Ham Paste' should contain 55% of meat consisting entirely of ham, whereas 'Meat Paste Ham' need only contain 27½% of ham, and the remaining 27½% of meat can be of any kind or quality.

"As regards fish pastes, the position is even more deceptive, *e.g.* 'Crab Paste' should contain 70% crab, but 'Fish Paste Crab' need contain only 10% crab, the remaining 60% of fish being of any kind.

"It is understood that the Codes of Practice have no legal standing, and that it seems possible that their character is reflected in the fact that until now they have not been published.

"Presumably the Codes, which were originally agreed when there were serious difficulties of supply, are now out of date and much against the public interest. The Codes of Practice as between manufacturers and the Ministry of Food have been referred to in cases taken in this country and some credence paid to them by the magistrates concerned and the Chief Inspector of Weights and Measures has expressed the opinion that legal standards should be made for all classes of foodstuffs such as those in point, for then the question of arrangements between manufacturers and the appropriate Government Department would not therefore arise."

Minister's reply. Commenting on the Staffordshire report in a letter to the County Councils' Association, the Minister of Food said that at the time that the revised codes for fish and meat pastes were under discussion the subject of statutory standards of content was being considered and there was some uncertainty as to whether it would not be appropriate to include the substance of codes in orders.

In the event the food standards committee decided that standards of composition for specific varieties were impracticable and that codes should continue.

This, the Ministry said, was because of the difficulty of assessing the amount of a named variety of fish or meat.

Austrian market for canned goods

Austria is a good potential buyer of canned fish according to a report by the export services branch of the Board of Trade, but active competition would have to be reckoned with from Germany and the Scandinavian countries. Although British canned foods sell on quality, they are expensive after payment of the high customs duty, by comparison with fresh foods and Austrian canned foods. Most Austrian food processing factories are not modern and many of the canned foods cannot stand comparison with well-known British products, but considering the lower prices of the domestic product, the demand for British canned foods is limited. Some British foods, such as fish, vegetables, fruits, fruit juices, tomato ketchup and soups, would find a ready sale if they were competitive in price. However, large quantities of fresh fruits and vegetables are imported, chiefly from Italy, and when they are available the Austrian consumer prefers them to the canned products.

Appeal for National Food College

Just before he completed his term of office as president of the Food Manufacturers' Federation, Mr. Colin S. Dence signed personally about 1,000 letters to all members of the Federation, asking for contributions towards the capital cost of building new premises for the National College of Food Technology and the provision of scholarships at the College. A note accompanying each letter pointed out that many applications received from persons outside the industry to attend the National College courses have had to be declined because of the inadequacy of the present accommodation at Cranwood Street, City Road, London, E.C.1. As in other industries, there is an acute shortage of technologists in the food industry and the proposed new National College, the total cost of which may be about £300,000, will be designed to help to bridge the gap and supply the technologists to meet the industry's needs.

Before the appeal was launched, three firms had already promised to donate to the fund the equivalent of double their annual subscription to the Federation. A fourth firm has promised to donate the equivalent of a year's subscription, to be doubled if the fund does not reach its target.

No enquiry into food profits

A proposal for an investigation of profits made by middlemen in the food trade was rejected by Mr. Heathcoat Amory, Minister of Agriculture, Fisheries and Food, in the Commons recently. He said he had no evidence that distributors' profits generally were unduly high.

If the Government tried to control them by legislation it would almost certainly result in the control of prices and allocation of supplies.

Price stabilisation campaign

A number of firms have given undertakings not to raise their prices during the first half of 1956 following the example set by the cement and plaster board manufacturers recently. The first food manufacturers to join the campaign are believed to be the Smedley Group. Mr. W. V. Smedley says that his Group will not raise the price of any of their 250 food products until at least June.

A packaging manufacturer, Boxfoldia Ltd., and an electrical equipment manufacturer, Electrothermal Engineering, have also decided to keep their prices stable for the next six months.

Glycerine cheaper

A reduction of 12s. 6d. per cwt. in the home trade price of chemically pure B.P. glycerine and industrial glycerine has been announced by Glycerine Ltd. As an example of the new prices, a 1 cwt. drum of chemically pure glycerine now costs between £12 11s. and £13 2s., according to the quantity ordered. Pale straw industrial glycerine costs 5s. per cwt. less than the pure grade.

FAO to examine price supports

A programme to improve the world's eating standards during the next two years has been approved by the FAO conference. On the international level it calls for FAO activity in examining systems of price support in various countries with a view to greater flexibility of production in relation to changes in demand, and a study of the international effects of national trade policies. It also authorises a global survey of renewable agricultural resources in relation both to potential production of agricultural products and to the needs of member countries.

The conference has also approved in general the Expanded Technical Assistance Programme, under which FAO for five years has taken a part in the U.N. programme of technical advisory aid. The assistance of experts in specific fields will total about $8 million during 1956. At the same time the session adopted a budget of $6,600,000 for 1956 and $6,800,000 for 1957.

OBITER DICTA

● In its world-wide effort to win friends and influence people for freedom, a major obstacle is the U.S. agricultural surplus.—*Time.*

● I recommend my patients to eat the tables with the meat and to be careful not to swallow their food too quickly.—*Medical Weekly.*

● Nicole Courcel as the call-girl who discovers she has not got the call is about as erotic as a plate of sago.—*Film critic in Evening Standard.*

● The salt shaker may yet take its place in the rogues' gallery of hypertension, along with fat, ticker-tape, and nagging wives.—*What's New.*

● Norwegian radio-critic Odd Bang-Hansen ate his hat, garnished with cherries and pineapple and served as an omelette prepared by an Oslo chef.—*Norway Press Bulletin.*

● Marriage may have been ordained for the creation of children. It was also ordained for the creation of steak-and-kidney pie, roast beef, apple pudding, and a well-brewed cup of tea.—*Philip Harben in Daily Express.*

● The first fine careless raptures of conjugal life are longer sustained in households where the soup comes out of a can and not from a two-day stint at the vegetable grater.—*Eve Perrick in Daily Express.*

● We are a sitting target for the bright advertiser who wants to sell us any of those astonishing made-in-a-trice foods with names like Trix, Bix and Lix, which leave one in such terrible doubt about how, or indeed where and when, they should be eaten.—*Article in Sunday Times.*

● And what of the sweet-suckers and ice-cream eaters? The crackle of sweet papers at Covent Garden has already provoked an outcry in these correspondence columns. Even at Wigmore Hall, once untainted by food and drink, ice creams are sold during the short interval with the result that many an artist begins the second half of his programme to the accompaniment of gobbled last mouthfuls and the furtive hiding of cardboard cartons under chairs—*The Times.*

News for Importers

Seedless raisins. Further applications are to be considered for licences to import seedless (as distinct from deseeded) raisins of any type from the U.S.A. to be purchased with dollars made available under the Mutual Security Act, 1954. Arrangements for the issue of the licences were first set out in Notice to Importers No. 751. The new details are given in Notice to Importers No. 768 issued by the Import Licensing Branch of the Board of Trade.

Bourbon whisky. In spite of arguments for the preferential treatment of American bourbon whisky, put forward by a representative of the Kentucky Distillers' Association to the Minister of State, Board of Trade, no relaxation of the import quotas is to be made. The minister explained that in the present U.K. balance of payments situation, it was not possible to relax the control on dollar import quotas.

Japanese salmon. Licensing arrangements for imports of the first instalment of canned and frozen salmon from Japan are announced by the Board of Trade in Notice to Importers No. 766. The president of the Board of Trade announced in the House of Commons recently that the quota for the import of canned salmon from Japan had been increased from £2·2 million to £4·7 million.

Token imports. The Token Import Scheme will continue in 1956 for imports from Canada and the U.S.A. on the same basis as in 1955. A notice to Importers will be issued shortly.

The object of the scheme is to allow into this country a strictly limited quantity of manufactured goods in which there is traditional trade and which we have had to restrict because of shortage of dollars. Quotas will remain at the same level as last year—30% by value of the average exports of the commodity in question to the U.K. in 1936-8. The total value of the quotas under the scheme is about £5 million a year.

Commonwealth sugar price

The price to be paid for 1956 "negotiated price" sugar bought under the terms of the Commonwealth Sugar Agreement will be £40 15s. per ton, the same as for 1955, following talks in London. The Agreement has been extended for a further year and will now run to the end of 1963. The quota review will be deferred for another year.

New address

The offices of the Institute of Refrigeration are now at New Bridge Street House, New Bridge Street, London, E.C.4. The telephone number is CENtral 4694.

New Fish Cannery at Whitstable

A MODERN fish canning factory, equipped with the most modern machinery and automatic handling devices, has been built at Whitstable, Kent, by British Fish Canners Ltd. It is due to be officially opened this month by the Parliamentary Secretary to the Ministry of Agriculture, Fisheries and Food, Mr. Harmar Nicholls.

The factory will handle Brisling and Sild Sardines. It is the third to be opened by British Fish Canners Ltd. The others—at Dundee and Leeds—work all the year round.

The company will now employ nearly a thousand people. About 100 inshore fishermen manning 40 or 50 boats on behalf of the company, work throughout the whole of the fishing season.

The new factory, which covers 30,000 sq. ft., is built on harbour land and it is expected that production will commence immediately, thus greatly increasing the company's present output to approximately 1½ million fish canned daily to meet the constant and ever-increasing demand by British housewives. Some 200 workers from the immediate locality will be absorbed by the new plant, including 170 girls and women.

The present achievement of British Fish Canners Ltd., under the leadership of the chairman and managing director, Mr. Cyril W. Banks, is emphasised by the fact that no more than 40 years ago, when the Leeds cannery first went into production, all the canned Brisling and Sild sardines consumed in this country were imported. To-day British Fish Canners Ltd., are capable of handling and processing vast quantities of these tasty and nourishing little silver fish of the very highest quality, which are sold under the names *Rob Roy* and *Royal Twenties*.

Hospital tests on canned soup

The nutritional quality of canned soups has recently been under investigation by the dietitian of a general infirmary in the North of England. As a result of these tests, Batchelors Peas Ltd. has received orders for its cream of mushroom, cream of tomato and cream of chicken varieties.

New Scottish bakeries

New bakeries at Perth and Fort William are to be built by the United Co-operative Baking Society. The new building at Perth will replace the bakery at present rented from the City of Perth Co-operative Society.

Mr. James Lang, chairman of the society, said at the quarterly meeting that the extension to the society's biscuit factory at Clydebank will be completed early this year. The total expenditure on the extensions to the factory up to date is £318,000, which includes all the new equipment comprising ovens, attendant plant, enrobers, and wrapping machines.

Milk powder company formed

The Milk Powder Marketing Company Ltd. (company limited by guarantee and having no share capital) has been registered in Scotland for "carrying into effect schemes for promoting or effecting improvement in the quality of milk powder, etc." Subscribers, all well known in the industry, are Thomas P. Dilwen, J. B. Douglas, A. H. Philpot, J. L. Davies, general manager, and H. W. Ewing, head of creameries, Milk Marketing Board, John C. Inglis, and William B. Barbour. Mr. Douglas is chairman and Mr. Inglis marketing officer of the Scottish Milk Marketing Board.

Cellulose casings factory for Swansea

The complete manufacture of cellulose casings for skinless sausages and other meat products is to be undertaken in a new factory at Swansea which is to be built by Viskase Ltd. At present the company import partly finished casings, mainly from Canada, and finishes them in their existing factory at Swansea. It is hoped that the new factory will supply casings for both the home and export markets.

Announcing this in London recently, Mr. A. Scholefield, chairman of Viskase Ltd., said that *Visking* cellulose skins cost no more than hog casings and something like one quarter of the current market price for sheep casings. He claimed that the advantages accruing to users of *Visking Nojax* casings for skinless sausages were numerous and included price stability, long life without deterioration and standard lengths and sizes. The casings are supplied ready shirred so that they can be quickly applied to stuffing machines, saving time and labour.

Another development announced by Mr. Scholefield is a new technique for the casing of many cooked and processed meats, such as hams and shoulders. With these transparent casings the meat is fully protected until sliced and handed over the counter. They can be printed so that the brand name appears on every product and can be easily applied to cooked meats. The casings shrink on to the product tightly, holding the meat firm and compact. The casing can be removed before slicing but, if sliced with the casing still on, it should be removed in a similar manner to the removal of casing from luncheon or breakfast sausage.

Quick-freeze trawler

Fitted with special equipment for a year's experiment in the quick-freezing of fish at sea, the Grimsby trawler *Northern Wave* left recently for the northern fishing grounds. The experiment is being sponsored by the Government, the White Fish Authority and distant-water trawler owners.

Half of the trawler's catch will be quick-frozen at sea, the remainder being iced down for landing in the ordinary way.

Sulphite preservative test

The sulphite preservative solutions test, used for the estimation of the strength of sulphur dioxide solutions in preserving fruit for jam manufacture, has been further developed by the British Food Manufacturing Industries' Research Association.

The equipment and chemicals for the original test are available through the Food Manufacturers' Federation, 4, Lygon Place, London, S.W.1, price £1 10s.

Under the BFMIRA development, the test is now suitable for application to fruit preserved in sulphur dioxide.

Kosher G.M.S.

Kosher glyceryl monostearate is being manufactured by Advita Ltd. for manufacturers of margarine and other Kosher foods. The new product will have a monoglyceride content of 37·5% and, as a result, will have greater emulsifying properties than the normal commercial G.M.S. with 32·5% monoglyceride content. In order to manufacture the product, Advita have made special arrangements to import glycerine derived entirely from vegetable sources, to comply with Kosher requirements.

Automation advisory company

Advice and, where necessary, design on automation processes in the fields of production, administration marketing and human relations is to be provided by Automation Consultants and Associates Ltd. Chairman of the new company is Sir Walter Puckey, a past-president of the Institute of Production Engineers.

Fire protection centre

The new London showrooms and offices at 25, Piccadilly, London, W.1., of Nu-Swift Ltd., the fire extinguisher manufacturers, have now been completed and are open. Specimens of the firm's principal products are on view and small orders urgently needed can be executed from this address.

The headquarters of the firm are at Elland, Yorkshire.

Concentrated beer

Experiments on the concentration of beer are being carried out by the brewing industry on behalf of the Services, according to a spokesman for the Brewers' Society. The industry has succeeded in concentrating the beer to about one-quarter of its original volume in laboratory tests and the next step will be commercial trials on a pilot scale. Freezing has been a successful process. The concentrate has then been successfully stored for periods of varying length and reconstituted as beer by the addition of water and by being carbonated.

The statement anticipated a question in the House of Commons about public expenditure on these experiments. According to the spokesman, "All the experiments to which I have been referring have been carried out by the Brewing Industry Research Foundation. Though they are being made with the co-operation of the Ministry of Food, they are not being carried out with public money."

Answering a question on how much money had been spent by the Minister of Agriculture, Fisheries and Food on experiments to produce concentrated beer, Mr. Heathcoat Amory said that direct Government expenditure, including hire of plant, purchase of materials and travelling expenses, had not exceeded £400. He had great faith in private enterprise, Mr. Amory continued, but he was particularly interested in this for the limited purpose of supplying beer to British troops overseas. He did not think that the experiments were likely to promote a widespread increase in the consumption of beer.

London office opened

Air Control Installations Ltd. have opened a branch office at 17, Manchester Street, London, W.1. Telephone: WELbeck 1306.

This office will deal with enquiries and sales in the London and South-East England area.

Furane concrete treatment

A low viscosity, partially condensed resin syrup of the furane type has been produced by Semtex Ltd., the Dunlop subsidiary, which is claimed to improve the resistance of concrete to corrosion by the mild acids and other reagents that attack the cement in it. The new product, *Furacrete*, which, it is said, can be used to advantage in the food industry, replaces part of the gauging water during the mixing. When the cement is hydrated in the normal manner the resin remains distributed until such time as acid solutions come into contact with the concrete. These acids cause the resin to harden into a corrosion-resistant mass and dilute acids cannot then attack the cement.

Erections and Extensions

Procea Products, Ltd., 47, Dean Street, London, W.1, will shortly have a new bakery and office premises erected at Colnbrook, Bucks.

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Union International Co., Ltd., 13, West Smithfield, London, E.C.1, are planning to erect a new meat products factory at Newry, N. Ireland.

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Carshalton Confectionery, Ltd., are planning new extensions to their factory at Back Carlton Road, Lytham St. Annes, Lancs.

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Northern Bacon Curing Co., Ltd., Havana Street, Belfast, are seeking permission to adapt part of an old mill at Whiteabbey, N. Ireland, for use as a bacon factory.

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Associated British Maltsters, Ltd., have decided to erect another malt factory in Yorkshire at an estimated cost of £500,000. This development follows the recent construction of a malt factory at Louth, Lincs.

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Carricks (Bakeries), Ltd., of Newcastle-on-Tyne, have had plans prepared for the erection of a despatch and transport building in Ponteland Road, Newcastle-on-Tyne.

▪

Schweppes, Ltd., mineral water manufacturers, Connaught Place, London, W.2, have purchased a large site near Dartford, Kent, for the proposed erection of a new factory.

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J. Lyons and Co., Ltd., are planning new extensions to the chocolate works and the erection of five cold stores at their food factory in Oldfield Lane, Greenford, Middlesex.

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Mac Fisheries, Ltd., Ocean House, Little Trinity Lane, London, E.C.4, are seeking to negotiate for the sale of land between Beevor Road and Salmon Road, Great Yarmouth, Norfolk, for the purpose of erecting new extensions to the Birds Eye Food factory.

Harcold Refrigeration, Ltd., are planning a new extension to their factory at Welmgate Road, Perivale, Middlesex.

▪

A. L. Simpkin and Co., Ltd., chemists and manufacturing confectioners, are having a new factory built at Hunter Road, Sheffield, at an estimated cost of £20,000.

▪

Plans have been approved for extensions to the factory of **International Biscuit Co., Ltd.**, in Ayres Road and Elsinore Road, Stretford, Lancs.

▪

Rowntree and Co., Ltd., have had plans for new extensions to the cocoa works in Haxby Road, York.

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Liga (Ireland), Ltd., infant food manufacturers, Ballyhaunis, Co. Mayo, Eire, are planning to build a new £100,000 factory on a site at Ballyhaunia in the near future. It is estimated that 100 workers will be employed at the factory. The parent concern is a Dutch company, trading as Liga Fabrieken N.V.

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J. Skrek and Co., Ltd., food manufacturers, of Cardiff, have opened a new distribution depot at 126, Seymour Place, London, W.1.

▪

British Canners, Ltd., have had plans prepared for the erection of a new storage building in Bewell Street, Hereford.

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Peerless and Ericsson have acquired a new factory at Wakefield to ensure the continuity of certain supplies essential to their production; their Leeds office will shortly be closing down and moving to Wakefield.

▪

T. Wall and Sons, Ltd., sausage, pie and ice cream manufacturers, of Acton, London, W.3, have had plans prepared for the erection of a new distribution depot on a site at Watling Street, Dartford, Kent.

COMPANY PROFITS AND PROSPECTS

Record flour sales

Sales of McDougall's self-raising flour reached a new high level, said the chairman at the annual meeting recently. Combined profits for the year were £790,400, compared with £624,639 for the preceding 10 months, in spite of the fact that throughout the past year the retail price of the flour was lower than it was when the Government decontrolled production and prices two years ago.

A final dividend of 10%, making 15% for the year, was paid.

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Biscuit makers clash with millers

Competition with other biscuit manufacturers and with large bread and milling interests was reported by Mr. Wm. P. Webster, chairman of Wright's Biscuits Ltd., at the company's annual meeting. Milling companies are intensifying their policy of buying up outlets for their own commodities and some of Wright's customers have been absorbed during the year in the process.

The company, which had marketed their products through a limited number of wholesalers before the war, found on de-zoning that their trade, which was formerly done with one or two suppliers, was spread among a number. At the same time several of their larger competitors who had kept their depots embarked on a very intensive drive for direct business. Although Wright's are meeting the challenge by extending their own sales force and by opening depots in those areas where distribution is affected, the chairman warns that this is both a slow and costly process.

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Machinery makers' peak sales

Record sales, 12% higher by volume than in 1953-54, were made last year by Frederick Braby and Co. Ltd., sheet metal engineers and makers of can-handling plant and other food machinery. The transfer of the company's remaining departments from Deptford to Crayford (see FOOD MANUFACTURE, December, p. 521) was accomplished and the new factory was operated on a profitable basis. The firm's Liverpool and Bristol establishments have again yielded satisfactory results and production at the new rolling and finishing mills at Glasgow is improving.

The total expenditure on new buildings, plant and machinery was £222,852 and commitments total £120,000 (£255,000). The dividend has been raised from 8¼% to 10%. Trading profits have risen from £308,000 to £499,000.

Butter and Margarine Regulations

The Minister of Agriculture, Fisheries and Food and the Minister of Health, acting jointly, have made—

(*a*) the Labelling of Food (Amendment) Regulations, 1955 imposing requirements as to the labelling, marking and advertising of margarine and margarine-cheese and

(*b*) the Food Standards (Butter and Margarine) Regulations, 1955 prescribing limits of water content for butter and water and milk-fat content for margarine.

The regulations apply to England and Wales only. They re-enact with modifications certain of the requirements of sections 32 and 33 of the Food and Drugs Act 1938 which in their application to England and Wales have been repealed by the Food and Drugs Act, 1955.

As to composition, the previous limits of 16% of water in butter and margarine and 10% of milk-fat in the fat of margarine are maintained, but no provision is made for the manufacture and sale of milk-blended butter.

The requirements as to labelling and advertising have been modified. The Minister of Agriculture, Fisheries and Food is no longer responsible for the approval of fancy names for margarine; and in other respects the provisions affecting labels are less restrictive.

There is, however, a prohibition against the use of brand or descriptive names or pictorial devices which refer to, or are suggestive of, butter or anything connected with the dairy interest; and claims that margarine contains or is made with cream or milk must be made in a prescribed form.

Margarine and margarine-cheese which is not prepacked must on exposure for sale by retail be labelled "margarine" or "margarine-cheese" as the case may be.

In conformity with section 47 of the Food and Drugs Act, 1955, which deals with cream substitutes, the word "imitation" is substituted for the word "synthetic" in item 3 of Table A of the First Schedule to the Labelling Order.

Canners' smaller profits

Instability in the prices of imported materials, unsatisfactory crops of home-grown vegetables and increased selling costs were blamed for a drop in the net profits of Stratford-on-Avon Produce Canners Ltd. by the chairman at the company's annual meeting. Net profits for the year ended May 1, 1955, amount to £25,908, compared with £30,003 in the previous year.

A final dividend of 19% on the Ordinary shares, making a total of 25% for the year, was approved.

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Venesta's £6 million turnover

A sales turnover of £6,800,483, the highest in the company's history, was reported by Mr. H. Rutherford, chairman of Venesta Ltd., at their annual meeting recently. The increase, he said, has been due to greater volume of sales rather than to higher prices.

The company's net profit was £261,684, an improvement of £85,730 on the previous year, while the consolidated net profit of £430,718 is an improvement of £187,179. An increased final dividend was paid, making 20% for the year.

All major capital expenditure has been completed for the modernisation of the collapsible tube department and the company believes that this will bear comparison with similar plants in any country.

At their Clayton factory, where until now the standard work has been the production of plywood barrels, a fibre drum has been produced, lined with aluminium foil. It is finding a ready sale in many branches of the industry.

FORTHCOMING EVENTS

Society of Chemical Industry

Food Group

February 9-10. "Recent Advances in the Knowledge and Uses of Phospholipids in Foods," by Professors T. P. Hilditch and A. C. Frazer, Drs. T. Malkin, B. A. Pethica, and J. N. Olley, D. H. Rhodes, Drs. J. N. Hawthorne, J. A. Lovern, F. Aylward, C. H. Lea, and H. H. Hutt. Feb. 9 commences at 9.30 a.m., and 2.15 p.m., Feb. 10 at 10 a.m., and 2 p.m., Wellcome Research Institute, 183, Euston Road, London, N.W.1.

February 22. "Corrosion Problems in the Dairying Industry," by G. A. Botham and Prof. E. C. Crossley, 6.30 p.m., Chemical Society's Rooms, Burlington House, Piccadilly, London, W.1.

Microbiology Group

February 8. "The Manufacture of Whisky," by W. D. Burnet, 6.15 p.m., Medical Society of London, 11, Chandos Street, Cavendish Square, London, W.1.

Pesticides Group

February 20. "Recent Advances in the Use of Insecticides in Animal Health," by Dr. J. Carmichael, 5.30 p.m., Chemical Society, Burlington House, Piccadilly, London, W.1.

Institute of Packaging

February 10. "Packaging for Retail Sale," 6.30 p.m., Grand Hotel, Bristol.

Institute of Refrigeration

February 23. "Modern Trends in Dairy Refrigeration," by H. Burley and E. J. Perry, 5.30 p.m., Institution of Mechanical Engineers, 1, Birdcage Walk, Westminster, London, S.W.1.

Physical Society

February 22. "Kippers, Cocktails, Confectionery and Colour," by G. J. Chamberlin, 3.30 p.m., Institute of Ophthalmology, Judd Street, London, W.C.1.

The Chemical Society

February 9. "Recent Progress in the Chemistry of Peptides," by Dr. G. W. Kenner, 6.30 p.m., Large Chemistry Theatre, Manchester University, and on *February* 17, 5.30 p.m., Chemistry Building, King's College, Newcastle-on-Tyne.

February 17. "Some Recent Developments in the Chemistry of the Vitamins D." by Prof. B. Lythgoe, 7 p.m., Royal Technical College, Glasgow, C.1.

Cake and biscuit conference

The Third Technologists' Conference of the British Cake and Biscuit Association will be held on Friday, February 10, at the Mayfairia, 32, Bryanston Street, London, W.1. The morning programme will consist, as usual, of four papers. In the afternoon, however, the first session for cake manufacturers will take the form of an open forum. The second afternoon session will be a combined affair with a paper on "Flavours, natural and synthetic" prepared by Mr. S. Nicholson and Mr. G. R. A. Short of W. J. Bush and Co. Ltd. Details of the morning papers are as follows:

Biscuits: (*a*) "Effect of sugar particle size on biscuit dough flow." Dr. D. W. E. Axford and Mr. F. J. H. Ottaway, British Baking Industries Research Association. (*b*) "Shortening for biscuits." Dr. T. Becket. (*c*) (Afternoon) "Wafers." (Speaker to be announced.)

Cake: (*a*) "Icings, coverings, fillings and decorations." A speaker from A. Bellamy and Co. (*b*) "Use of egg in cake production with special reference to pasteurised frozen whole egg." Mr. A. E. Farrand, Inglis and Co. Ltd.

APPOINTMENTS AND RETIREMENTS

MR. LIONEL KITCHINGMAN has been appointed manager of the meat-products' development and quality-control department of T. Wall and Sons (Meat Products), Ltd., in succession to Dr. E. T. Murdock.

*

MR. S. G. COPPING has been appointed London area sales representative by Electropower Gears Ltd. Mr. Copping was previously London sales representative for Anchor Chain Co.

*

MR. WILLIAM GOULD has retired from his position as general manager of Marsh and Baxter Ltd. Mr. Gould, who is now in his 81st year, joined the company in 1907 when he was 32. He was sent by the firm to open an office in London and 11 years later returned to the Brierley Hill HQ of the company. Although Mr. Gould is in perfect health he feels that the time has come to give younger men a chance. He will have the good wishes of a large number of friends and colleagues on his retirement.

*

MR. C. D. LOVELL, factory manager of Alfred Bird and Sons Ltd., has been elected chairman of the Birmingham Industrial Safety Group. One of his first major tasks will be to supervise the establishment of the Group's pioneer industrial safety training centre in new premises at Acock's Green.

*

MR. H. REVELL has been appointed general sales manager to Peerless and Ericsson following Mr. J. C. Jenkinson's resignation.

*

MR. H. K. RAVENHILL, has been promoted from sales manager of Latham and Co. Ltd., to the board as sales director.

Obituary

MR. GEORGE LEVY, vice-chairman since 1928 of George Cohen Sons and Co. Ltd., the parent concern of the "600" group of companies died on December 20, aged 71. Until recently he was chairman of K. and L. Steelfounders and Engineers Ltd., and of T. C. Jones and Co. Ltd. He leaves a widow, a daughter and two sons, both directors of George Cohen Sons and Co. Ltd. and various associated concerns who have, respectively, 28 years and 19 years of service in the group.

MR. G. E. PRIDEAUX, a director of the Thompson and Norris Manufacturing Co. Ltd., died suddenly on December 20.

After serving with the Royal Flying Corps in the First World War, Mr. Prideaux spent the whole of his career in the paper and corrugated fibreboard industries, joining Thompson and Norris in 1923. He was appointed sales manager in 1944, and joined the board in January, 1950.

Mr. Prideaux was an accepted authority on paper and corrugated fibreboard packaging and served on many committees where his advice and knowledge were of very great value. He was chairman of the Fibreboard Packing Case Manufacturers Association for 1953, having been a member of its committee for many years.

His death came as a shock to all who knew him and he will be very sadly missed.

MRS. KAREL BOHEMEN, wife of the director of Polak and Schwarz (England) Ltd., died on December 3. The funeral took place at the Golders Green Crematorium on December 7. It was attended by directors and executives from the parent company in Holland and representatives from the French and Belgian associated companies as well as the leading administrative staff from Enfield.

MR. HENRY PALETHORPE died on December 21 at his home, Stone Manor, near Kidderminster, aged 74. He was for 30 years head of the Tipton sausage firm of Palethorpes Ltd., which was founded by his grandfather in 1852.

Mr. Palethorpe was appointed managing director of the firm in 1921 and its chairman two years later. He retired four years ago. He leaves a widow, a son, Mr. R. H. I. Palethorpe the present head of the firm and a daughter.

Food men honoured

Lt.-Col. Fordham Flower, a director of Flower's Breweries Ltd., was named a Knight Bachelor in the New Year's Honours List. Arthur Weston, C.B.E., legal adviser, Ministry of Agriculture, Fisheries and Food, was also knighted. Other honours included:

O.B.E.

L. R. Armstrong, deputy chairman, British Cellophane Ltd. J. S. McQuillin, member, Central Milk Distributive Committee. L. J. Seward, immediate past president, National Federation of Meat Traders' Associations.

M.B.E.

W. F. Spencer, milk movements officer, Milk Marketing Board.

Food News Overseas

Chilean milk and meat plants

A new milk pasteurising and processing plant and a modern abattoir with a cold storage section are to be erected at Temuco, Chile, the former to cost Ch. $60 million and the latter Ch. $210 million. The funds will be provided by private investments and municipal grants.

Dutch gelatine firm in Canada

The first Canadian branch of the Dutch firm, Glue and Gelatine Works of Delft, will be opened soon in Trenton, Ontario. A 6½ acre site has been optioned, and construction work will start in the spring on a factory with floor area of 20,000 sq. ft., similar to one of the parent plants in Delft.

The new plant in Trenton will operate on three shifts, and will produce edible and technical gelatine for use mainly by the food, photographic and pharmaceutical industries. Special machinery will be brought from Holland, but this will be completed with Canadian fittings. All employees, except the plant manager, who will come over from Delft, will be engaged locally.

Food and crops in the Bahamas

Mr. W. Leonard Hill, chairman of Leonard Hill Limited, publishers of FOOD MANUFACTURE, recently returned from a tour of the Caribbean. He points out that although a great amount of manufactured food is imported into the Bahamas, few British names are seen in the shops and warehouses. He continues: "For instance, at Rock Sound there is a small, well-stocked, self-service store based on one started by the Colonial Development Corporation some years ago. The only British names I saw in this store were Hartley's jams, Eno's and Andrew's and one or two of the British—but which are really international—pharmacy names. Neither in Eleuthera or Nassau did I see any British agricultural machinery.

"Their own exports are chiefly handwork, breadfruit, bananas, coconut, sapodilla, citrus, guava, paw-paw, avocado pears, tomatoes and pine-apples. They export some hard woods —Lignum-Vitæ, Horse-Flesh, Madeira, Logwood; a good soft wood is grown —Casuarina. This is used for piers, as apparently it stands up well under water. There are also grown: Palms, both coconut and Royal, Poinciana, and many tropical flowers. The leaf of the Wild Orange has a very sharp, spicy odour, but I could not find out if it is used commercially.

"There is a rather loose organisation at Eleuthera, known as the Farmers' Co-operative, but it appears to me that the labels they use are supplied by a Nassau merchant, and there seems to be no guarantee that he will buy their crop. I believe the Bahamian farmers could be much better organised. If the Colonial Development Corporation had continued their work there they might have had some guarantee as to the export of their crops.

"Eleuthera Ltd. act as general merchants, and have branches at Hatchet Bay, Three Boys Farm and Rock Sound."

Provisions exhibition

"Ikofa," the International Exhibition of Groceries and High Class Provisions, is to be held in Munich from September 21 to October 7, 1956, coinciding with the annual influx of visitors to the Oktoberfest.

Turkish meat products factory

A plant to supply meat and meat products to the province of Ankara has been opened in Turkey. The factory, which will employ from 550 to 600 workers, has a slaughter house capacity of 180 cattle and 1,962 sheep in a day. The cold storage capacity is 3,500 sheep and 800 cattle and the capacity for frozen storage is 8 to 10 thousand cattle. It is claimed that the factory can produce 45 tons of sausage per week. Three other factories are under construction elsewhere in Turkey and a further three are planned.

Israeli sugar cane experiments

Experiments are taking place in Israel on the growing of sugar cane and sweet sorghum to supplement the supply of sugar beet for the local sugar industry. Although sufficient beet can be grown to meet all local requirements, the exclusive use of beet means that the sugar factories are only occupied for three months each year. If sweet sorghum and sugar cane can be grown economically, the working season of the factories will be extended and their operation more economical.

The new sugar factory at Afula is able to process 80,000 tons of sugar beet during the season which will yield 12,000 tons of sugar or almost 40% of domestic requirements.

Fifty million sewn sausage skins

The 50 millionth sewn sausage casing since operations were started 25 years ago has been produced by the Oppenheimer Casing Co. in their Chicago sewing plant. These special casings, tailored for liver sausage, salami and many other varieties of dry sausage, are sold to meat processors throughout the U.S. The British branch of the 41-year-old Chicago firm supplies over 200 varieties of sausage casing.

Rust in canned fish

Thousands of pounds worth of canned fish from a South African factory had to be dumped or sold at a loss because of damage to the products by rust reported the chairman of the company, Ovenstone South West Investments Ltd., of Cape Town. Heavy losses were also incurred with a large pack of oval tins in which part of the production had to be discarded and claims had to be paid on pilchards exported to various parts of the world. The chairman claims that the problems and complaints have been overcome by new closing equipment and this, together, with revised techniques in other directions has given the company a pack which it believes will give no trouble at all.

Vintage wines from Australia

A vigorous concerted programme to raise the status of Australian wines by fundamental studies of vine culture has been launched by the recently constituted Australian Wine Research Institute. The objective is to establish in all the wine regions the intimate research which is traditional in the vineyard countries of Europe. The principal difference is that it is intended to build up a fund of essential information quickly, instead of in the course of generations. The first studies will be to ascertain precisely which vines are best suited to particular areas, taking account of all the characteristics of the vines themselves and of the soils, climates and water supplies. The centre of research will be the Australian Wine Research Institute, which has already assembled a staff for the purpose. A building is to be built in Adelaide. It is intended to have it in operation within a year. Mr. K. Kilgariff, Secretary of the Federal Viticultural Council, forecasts: "Australia will be able to produce wines as good in every way as the most select vintages from the small, choice vineyards of Europe."

Packaging

Patti-pans which can be produced from reels of aluminium alloy foil at the rate of 5,000 per hr. on a new machine, the die of which is shown here.

Mass-producing patti-pans

Following world trends in the bakery trade towards aluminium cases instead of paper and board, Fords (Finsbury) Ltd. are manufacturing machines, based on their dairy cap making machines, to make patti-pans, custard pots, pie and tart cases from reels of aluminium alloy foil.

The machine making the smallest of these cases—the patti-pan, produces 5,000 pans per hr. A battery of these machines, each for different sizes, can be worked by one operator, it is claimed. They will be sold to manufacturers of bakers' sundries.

In each machine the tools are aligned by Fords on assembly and, as the machine is designed for one cap size and all servicing and maintenance is performed without removing the tools, it is not necessary to have an engineer on the premises to replace or realign the tools.

Split cake pack

Half a cake or a whole cake can be made from a new American "split cake mix" described in *Modern Packaging*. Two half-units of prepared mix are each contained in a heat-sealed pouch of polyethylene-coated glassine. A waxed paper sheet is used for an insert and can be cut out for use as pan liners. The advantages claimed for the idea are that the housewife can make one small cake at a time, make two layers or make layers of different cakes.

The manufacturers—Dromedary Co.—also claim that the mix has been prepared from a "pre-creamed" formula that cuts down beating time to 3 min. (less than that needed for most competitors) and makes the cake stay soft and moist longer. They say that a new kind of shortening makes the cakes "lighter and richer."

Heavy wax coatings for tubes

Collapsible tubes can be internally coated with heavier weights of wax of between 40 and 50 gm. per sq. metre by a new bulk production technique developed by Venesta Ltd., for tubes in diameters ranging from ¾ in. to 2 in. The present average coating weight is 25 gm. per sq. metre. Venesta claim that the heavier coatings will give far better protection to the product and at the same time will considerably widen the scope of the collapsible tube pack. Thus a number of dairy products and other foodstuffs whose chemical properties have up till now made them unsuitable for this type of pack can now be sold in the heavier waxed tubes with complete safety, it is claimed.

New jam labels

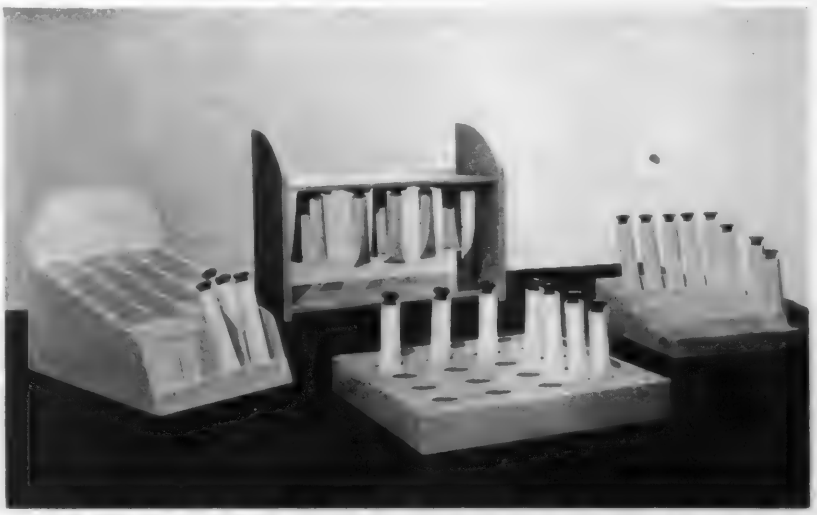
St. Martin preserves are now appearing in a new dress, which was designed by P. Pickard Jenkins, M.S.I.A., of the Metal Box Company's package design studio. The new labels are thought to be particularly suitable for self-service stores and shop window display.

To suggest high quality, simple lettering and rich colours were chosen for the labels. They therefore show up well on shelves and counters, whether singly or displayed in quantity, and are equally effective when reduced in size for ¼ lb. and miniature jars.

The contents of each jar is given in bold, clean, well-spaced lettering on a flat background of colour, with different colours for each type of jam or preserve. A bright red is used for strawberry, a rich purple for blackcurrant, green lettering on a lemon yellow ground for lemon curd, and so on. An exception to this is the mincemeat label, which has red and white lettering upon diagonal stripes of green and deep purple, to give it a festive look.

Oblong can

A new oblong can designed for packaging a wide range of liquids has been introduced by the American Can Co. It is claimed that the new container is the first solderless oblong can on the market with many unique features. These include a clinched nozzle said to prevent corrosion, and a "no-drip" spout with an outward curl on the neck that eliminates the sharp inside edge. The enamelled inside of the can provides full protection for "hard-to-hold" products, according to the company.



Some of the devices for displaying tube-packed products in self-service stores demonstrated by Mr. C. G. H. Cooke at a recent meeting of the Self-Service Development Association, under the auspices of the Collapsible Tube Manufacturers' Association. All the devices are of original design except the model in the back-centre, which is based on a method widely used on the Continent.

New Companies

M. Rosenhead, Ltd. (551410.) 235, Amhurst Road, London, N.16. Importers of and dealers in meat. £100. Dirs.: M. Rosenhead and H. Pinnick.

Tetra Pak (London), Ltd. (551434.) 7, Arundel Street, London, W.C.2. Manufacturers of and dealers in packaging and wrapping machines, transformers, etc. £10,000. Subs.: H. A. Southwell and H. Slatford.

H.A.G. Lifebelt Coffee Co., Ltd. (551471.) 19, Fenchurch Street, London, E.C.3. To acquire certain trade marks consisting of or comprising (*inter alia*) the letters "H.A.G." with or without various devices in respect of coffee, tea and cocoa, together with the goodwill of the business concerned in the goods with respect to which the trade marks are registered and with a view to enter into an agreement between H.A.G. Coffee Co., Ltd., and Robert E. Harkey. £1,000. Dirs.: A. N. D. Smith and R. E. Harkey.

W. Hall (Bacup), Ltd. (551473.) Todmorden Road, Bacup, Lancs. To take over business of a wholesale fruit and potato merchant carried on as "W. Hall" at Bacup, Lancs. £1,000. Dirs.: T. and E. Bohen.

Edward Baker, Ltd. (554070.) Cornard Mills, Sudbury, Suffolk. To take over business of millers and merchants carried on by Edward Baker Holdings, Ltd. (formerly Edward Baker, Ltd.). £30,000. Subs.: G. Crout and G. G. Ellston.

Phils Cakes, Ltd. (554164.) 19, High Street, Andover, Hants. Bakers and confectioners. £100. Dirs.: J. K. Dance and P. Marshall.

Stanley Hughes (Scotland), Ltd. (554235.) 4, Chapel Street, Preston, Lancs. Mfrs. of and dealers in boiled sugar confectionery. £100. Subs.: A. S. and Mrs. Catherine Hughes.

Tudor Inns, Ltd. (554324.) 16, Coleman Street, London, E.C.2. Brewers, maltsters, hop merchants, distillers, farmers, wine and spirit merchants, etc. £50,000. Dirs.: A. S. D. Albert and B. S. G. Bishop.

Just Squeeze Juice Co., Ltd. (554273.) Lion House, 72, Red Lion Street, London, W.C.2. £100. Dirs.: E. Hack, Mrs. J. V. Stevens, Mrs. A. M. Staines and Miss P. F. Brown.

Brookes Technical Services, Ltd. (550379.) Skerton Road, Old Trafford, Manchester. To undertake analytical research and development work in connection with the mfr., sale and distribution of foodstuffs generally. £100. Subs.: O. Mills and V. Bath.

Malden Bakeries, Ltd. (550397.) 96, Burlington Road, New Malden, Surrey. £1,000. Dirs.: R. L. G. Smith and F. C. Macarty.

Lennels (Confectionery), Ltd. (550448.) To take over business carried on at 24, Queens Square, Adeyfield, Hemel Hempstead, by Leonard W. Corbett and to carry on business of mfrs. and dealers in confectionery. £500. Dirs.: L. W., E. K. L. Corbett and F. King.

May-Joy, Ltd. (550497.) 1, West Bawtry Road, Rotherham. Mfrs. of and dealers in fruit wines, cordials, syrups, juices, etc. £100. Dirs.: E. N. Adsetts and G. Ripley.

From Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.

The Leonard Hill Technical Group this month

Manufacturing Chemist.—Solubilisation with Amphiphilic Compounds, 1; Effect upon Emulsions of the Hydroxy Compounds in Beeswax; Recent Developments in Pharmacognosy; Chromatography—Its future in Industry; Progress Reports: Therapeutics, Pest Control Chemicals.

World Crops.—Control of the Nun Moth in the Forest of Ebersberg; Control of Game and Vermin animals; Work of the Sarawak Department of Agriculture; The Swaziland Irrigation Scheme.

Fibres. — Variance Length Curves for Jute Yarns; the Use of the Uster Evenness Tester; the Future of Abaca; The Transport Position.

Corrosion Technology. — The Sodium Hydride Process for Descaling Metals; Low Temperature Corrosion by Flue Gas Condensates.

Chemical and Process Engineering.—Hydrazine as an Oxygen Scavenger; Evaporation; Chemical Industry Trends in Europe; Automatic Pressure Butt Welding of High-Pressure Pipe Lines.

Dairy Engineering.—Cleaning and Sterilising Aluminium Dairy Equipment; Crate Stacking Equipment; Electric Dairy Water Heating and Steam Sterilising Equipment, 1; Liverpool—Last Stronghold of Town Cowkeepers; Functions of the Food and Drugs Sampling Officer; Developments in Filling Machines.

Paint Manufacture.—Stearates for the Paint Industry, 2; The Formulation of Industrial Paint Removers; Texture Finishes; Maleic Modified Drying Oils.

Petroleum.—European Association of Exploration Geophysicists—Report on Ninth Meeting; Recent Developments in Oil Geology, 1; Corrosion Inhibitors in Petroleum Refining.

Atomics.—Chemical Processing in the Nuclear Power Industry, 1; Reactor Transfer Functions; Barrier Creams in Radiochemical Operations.

Muck Shifter. — Excavating Under Water; Muck Shifting in the Soviet Union; Outline of the scheme for the Dam at Assuan, Egypt; Cromwell Road Extension.

Trade Marks

APPLICATIONS

TABLE TALK.—742,826. Biscuits (other than biscuits for animals). **Towers Creameries, Ltd.**, Towers Factory, Commonside East, Mitcham, Surrey; manufacturers and merchants.

ALMOND JOY.—743,440. Chocolate covered bars of coconuts and almonds. **Matlow Brothers, Ltd.**, Brunswick Works, New Mills, near Stockport, Cheshire.

CHOCOLATE GONGERS. — 743,457. Chocolate confectionery (not medicated). **J. Whitehouse and Co., Ltd.**, Mascot Works, Church Road, Tarring, Worthing; Manufacturers.

BLOCK BUSTER and **DAM BUSTER.**—743,896 and 743,897. Non-medicated confectionery. **A. and B.C. Chewing Gum, Ltd.**, 61, Oak Grove, Cricklewood, London, N.W.2; Manufacturers and merchants.

ZESSTROSE.—742,915. Non-alcoholic drinks and preparations for making such drinks and fruit juices. **O. R. Groves, Ltd.**, 32, Shaftesbury Avenue, London, W.1; Merchants and manufacturers.

ZESTROZE.—742,917. Non-alcoholic drinks and preparations for making them. **O. R. Groves, Ltd.**, 32, Shaftesbury Avenue, London, W.1; Merchants and manufacturers.

SOLAMBER.—744,109. Wines, spirits and liqueurs. **British Casks, Ltd.**, trading also as **Broadway Wine Co.**, Old Court, Cox Green, Maidenhead; Merchants.

KOOKABURRA.—744,197. Australian wines. **H. H. Finch, Ltd.**, 120a, Kensington Park Road, London, W.11; Merchants.

BAMBI.—738,462. Margarine. **Nordic Food Products, Ltd.**, 41-45, Neal Street, London, W.C.2; Merchants.

NAMCO.—738,607. Fish (other than live fish), canned and bottled fruits, vegetables and meats. **Anderson and Coltman, Ltd.**, Market Buildings, 29, Mincing Lane, London, E.C.3.

NELL GWYN.—741,571. Marmalade, jams and lemon curd. **Crosbie's Pure Food Co., Ltd.**, Fruit Farms, Bradley, Lincs.; Manufacturers.

SNOWDROP FILLETS. — 743,397. Smoked fish fillets. **Snowden and Woods, Ltd.**, Albion Street, Grimsby, Lincs.; Fish merchants and curers.

GOLDEN CHARM.—743,955. Canned fruit, preserved fruit and fruit pulp. **R. Phillips and Son, Ltd.**, 2/4, Potters Fields, Tooley Street, London, S.E.1.

LUCKY DIP.—735,030. Non-medicated boiled sugar sweets, non-medicated confectionery containing sherbet and confectionery in the form of cigarettes. **Arthur Turnbull Edwards** trading as **Edwards and Sons**, 1, Warwick Road, Thornton Heath, Surrey; Manufacturers and merchants.

GOLDEN CROWN.—738,638. Non-medicated sugar confectionery, chocolate and chocolates. **R. S. McColl, Ltd.**, 142, North Woodside Road, Glasgow, N.W.; Manufacturers and merchants.

TOFF-O-LOLLY.—B741,314. Lollipops, being non-medicated confectionery. **Norwales Confections, Ltd.**, Warren Drive, Prestatyn, North Wales; Manufacturers.

WIGWAM.—742,199. Ice cream and frozen confectionery. **The Stansted United Cream Ice Co., Ltd.**, 8, Horse and Dolphin Yard, Macclesfield Street, Shaftesbury Avenue, London, W.1; Manufacturers and merchants.

Information and Advice

This Service is available to subscribers to Food Manufacture. If a stamped addressed envelope is enclosed replies will be sent by post, but enquiries cannot be answered by telephone.

Standard for soft drinks

B.7634 *I am interested in placing a very large contract for the purchase of mineral waters of the normal 20 oz. type. It is essential that a definite standard of the strength of essence or syrup, etc., used be specified. What information would be necessary to determine such a standard?* (London, W.1)

All soft drinks must comply with the standards laid down in the Schedule to the Food Standards (Soft Drinks) Order, 1953. Specifications for individual drinks will depend upon the type of drinks in question, and should cover such factors as sugar strength, degree of acidity, saccharin content (if present), while the gravity figure of the beverage is useful as a general check.

It is extremely difficult, if at all possible, to check the amount of flavour used other than by taste, and so the maintenance of the standard in this respect is assessed by tasting.

Fat concentration in cans

B.7602. *During the sterilisation of our beef products (canned loaf and canned sausages) part of the fat content is concentrated on the inner side of the can. For example in an A.1 can of loaf the amount of fat consists of about 15% of the pack and half of it extrudes as mentioned. I should be grateful for your advice.* (Tel-Aviv, Israel)

We would suggest that for your canned meat loaf, the fat should not be minced too finely, or over chopped when added to the bowl cutter. The inclusion of about 1 oz. of sodium metaphosphate powder early in the chopping would help retain the fat.

The fat content of your canned sausages should be reduced to about 18% and the phosphate powder added in the bowl cutter as already suggested, using 1½ oz. per 25 kg. of mix.

Wrinkled can labels

B.7640. *We are troubled with label distortion on our canned goods—at the time of labelling they seem all right, but three months later they are loose and wrinkled. Our storage conditions are poor during winter, as the store is unheated, and we have night temperatures as low as 28° F. and humidities quite often at 90% or more. Our pick up glue and lap paste are both dextrin based. Our problem seems to arise from water getting into the label or perhaps because the dextrin adhesives are very hygroscopic and become tacky and cause the labels to "give". In some cases the cans may be wet when labelling but we do not think this accounts for much of the trouble.* (Auckland, New Zealand)

Undoubtedly any re-moistening adhesives used on a can will not only give rise to your troubles but will also have a tendency to rust. A range of cold pick-up gums (maker's name supplied) is specially formulated to withstand the conditions you describe: hot non-aqueous pick-up cement is similarly available. However, as you are used to dextrin type adhesives we suggest you write for samples of these.

From the description of your difficulties, it might also be that the grain of the label is responsible for the loosening and wrinkling. The label should be made so that the grain of the paper is lengthways to the label running around the can. This will ensure that the changes in label circumference with changes in humidity will be at a minimum. You might also varnish the labels as this may help in reducing moisture absorption of the paper.

Luncheon meat—correction

The recipe given in answer to enquiry B.7617 (p. 41, January issue) is intended for a Veal and Pork luncheon meat and *not* a pork or pork and veal product as suggested. It is also desirable to increase the total meat content by 2 lb. and reduce the weight of the other ingredients accordingly so that the meat total is more than 80%.

Information supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery and materials and also general information as follows:

B.7663. *Recipes for custard powder of different flavours.* (Bombay)

B.7664. *Information on machines used for apple packing.* (Beirut)

B.7665. *Recipes for chocolate centres using invert sugar.* (Slough, Bucks.)

B.7666. *Literature on manufacture of fish sausages.* (Cape Town)

B.7667. *Makers of machine for cleaning dried fruit.* (Warrington)

B.7668. *Information on manufacture of papain.* (Baroda, India)

B.7669. *Uses of wheat bran.* (Bombay)

B.7670. *Makers of candy kneading machine.* (London, E.13)

B.7671. *Information on patent gluten preparation.* (Helsingborg, Sweden)

B.7674. *Manufacturers of lecithin.* (Thurles, Tipperary)

B.7675. *Manufacturers of pumps.* (Preston, Lancs.)

B.7676. *Advice on manufacture of flavoured cornflour.* (Bombay)

B.7677. *Makers of machine for making straws.* (Guildford, Surrey)

B.7678. *Manufacturers of continuously operating density meter.* (Hereford)

B.7679. *Recipe for Welsh rarebit mix using dry granular cheese.* (Manchester)

B.7680. *Suppliers of hydrogenated cod liver oil.* (Belfast)

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

736,885. De Laval Separator Co.: Refining of fatty oils and fats.
736,941. I. H. Oxford and D. L. Dike: Machine for peeling potatoes and the like.
741,663. Cuvinex Co.: Process and compositions for treating wines to prevent clouding.
741,562. Wallace and Tiernan Process Co.: Manufacture of dough and baked products.
741,624. W. E. Gill: Pipe coupling member and support bracket for beer pump systems.
743,978. Rose Bros. (Gainsborough), Ltd.: Production of wrapped packages.
743,845. Unilever, Ltd.: Foodstuffs.
743,802. O. Massey: Dough-making machines.
743,871. T. and T Vicars, Ltd., W. and R. Jacob and Co., Ltd., W. and R. Jenkins, J. B. Jenkins, J. F. Naylor, and C. Y. Lewis: Manufacture of edible dough products.
743,875. T. Robinson and Son, Ltd., and H. Ormerod: Machines for purifying and grading cereals.
742,328. Baker Perkins, Ltd.: Feeding and batching of biscuits.
742,277. O. Oehring: Method of and apparatus for cooking foodstuffs.
742,031. Kalle and Co. A.G.: Manufacture of regenerated sausage casings.
742,344. Continental Can Co., Inc.: Apparatus for filling cans.

ABSTRACTS OF BRITISH PATENTS

Flour milling machines

A collector, conveyor and exhauster comprises a hopper having a bottom opening for the delivery of stock into an air channel (extending to a stock-conveying line) having an extension which communicates with an opening in the hopper at a height above the level at which stock accumulates in the hopper, so as to provide an exhaust to the machine.—736,913. *Henry Simon, Ltd.*

Bottle crates

A crate, for milk bottles, etc., comprises the usual framework, including a tray upon which the bottles rest and upstanding spacers providing nests for the bottles. The upper end of each spacer is of skeleton pyramid or dome form, and the level of the tray is above the plane defined by the bottom of the crate.—736,837. *J. M. Allen.*

Chocolate enrobing machine

A water-jacketed chocolate container is heated electrically, and a pre-set temperature controller interrupts current output. Thermostatically controlled circulation of cold water through the jacket counterbalances the effect of the heating means, to prevent further heat transfer to the container when a pre-determined temperature has been attained and the current has been interrupted.—736,810. *W. D. Meagher et al.*

Animal feeds

An animal feed is produced by mixing an animal food composition with a glutamic acid solution from which glutamic acid has been separated and which is obtained from concentrated Steffen's filtrate or animal or vegetable protein.—738,679. *International Minerals and Chemical Corp.*

Grain cleaner

A grain cleaner (for dehusking and polishing grain) includes a cylindrical casing, a rotor with attached cleaning means rotating in the casing, a tangential socket on one side of the casing to which the grain is delivered through a pipe in a stream of gas (*e.g.* air), an tangential socket on the other side of the casing for discharge of the grain into a pipe, and a thrower wheel inside the tangential socket on the discharge side.—737,895. *M. Muhlenbau und Industrie Ges.*

Cereal roller mills

The speed of the feed rolls is arranged to respond rapidly to any variations in the feed to the roller mill by the provision of a balance plate in the mill feed hopper, the position in the feed of which is determined by the head of stock in the hopper, this position controlling the degree or extent of restriction of fluid flow from the delivery sides of the intermeshing points of the sun wheel and planet pinions of a hydraulic torque converter between a power shaft and a driven shaft of the machine.—738,558. *Henry Simon (Holdings), Ltd.*

Pasteurising and sterilising liquids

A method of pasteurising or sterilising liquids in metal drums includes the steps of feeding the drums into a temperature-raising chamber, halting the feed movement before the drums leave the chamber, rotating the drums and spraying them with hot water or steam while the feed movement is halted, and continuing the feed movement to discharge the drums from the chamber.—738,274. *S. J. Young.*

Pasteurising apparatus

A continuous circulation of the same quantity of cooling water in a cooling compartment of a tunnel apparatus is effected by supplying sprinklers in the roof with water collected from the floor.—740,870. *Bronswerk N.V.*

Handling bottles

A machine for uncrating bottles includes a conveyor for feeding loaded crates one by one to an unloading position, a stop for retaining each crate in this position, and a bottle-removing mechanism for gripping all the bottles individually, lifting them as a group from the crate, and releasing them to an unloading table, which consists of co-operating grid members movable into one position to allow passage of the gripping members and into another position to support the bottles. A gripping member includes, in a tubular housing, a tubular slide biased outwardly from the housing by a spring and in an internal guide tube a spring-loaded plunger. The slide carries spring-gripping fingers for holding a bottle neck, which fingers are opened by a downward movement of the plunger for releasing the bottle. The machine is claimed to be specially applicable to the cleaning of milk, beer, and other bottles.—740,244 and 740,245. *G. Hopkins and Sons, Ltd.*

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A substitute for albumens, especially suitable for the clarification of wines, consists of neutral glue (or isinglass) 35%, lactose powder 20-25%, glucose powder 10%, gum arabic or cherry gum 2%, tartaric acid 5-10%, dried egg white 10% and vanilla 1%. The isinglass is clarified at 35-40°, filtered, cooled and solidified. The ingredients are mixed and treated in an autoclave at 50-55° for 1·:-2 hr. This treatment is repeated for a number of days and the product is dried.—*Spanish* 212,553.

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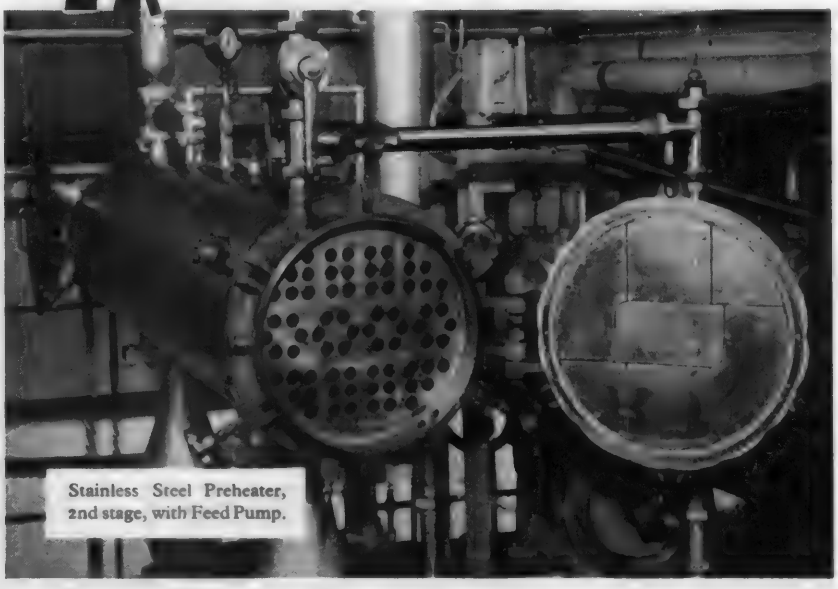

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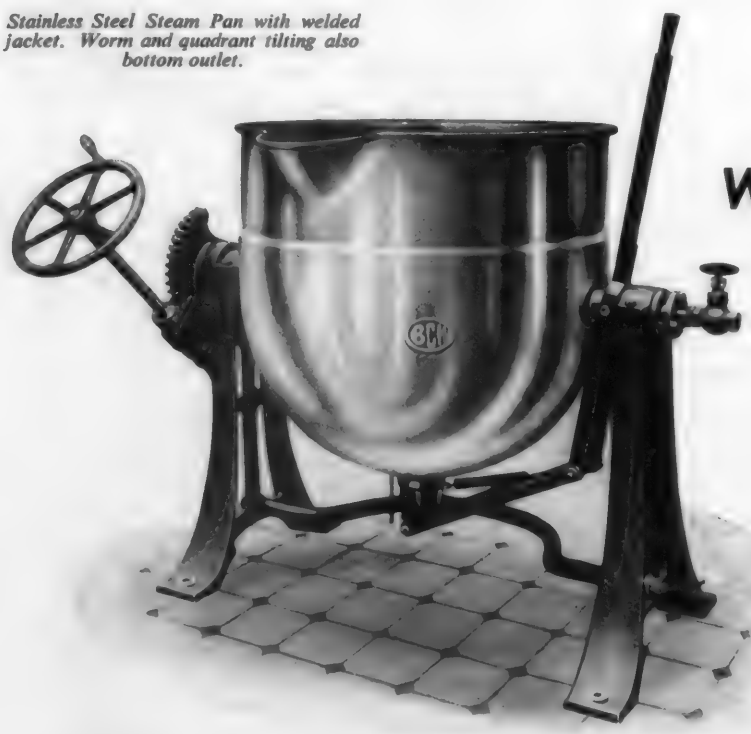

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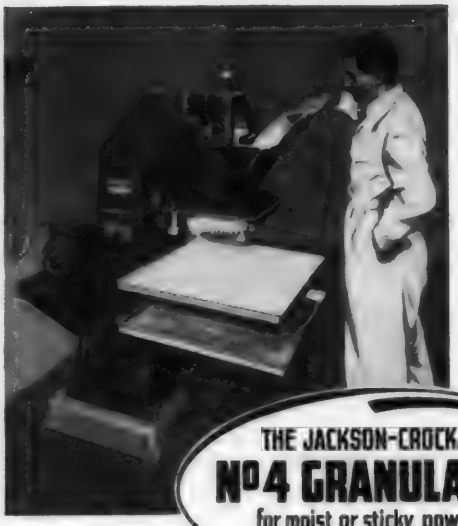

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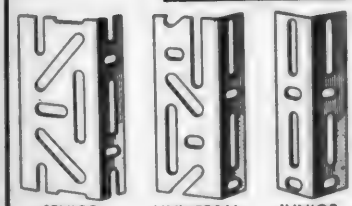

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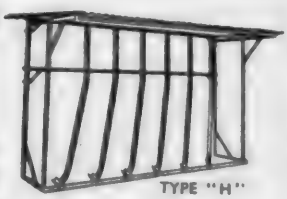

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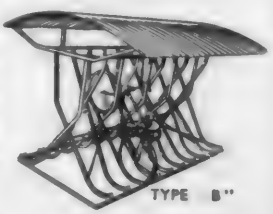

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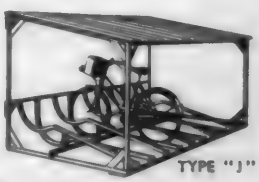

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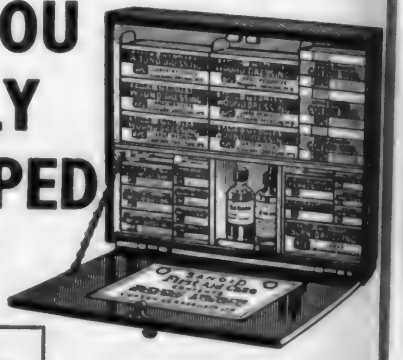

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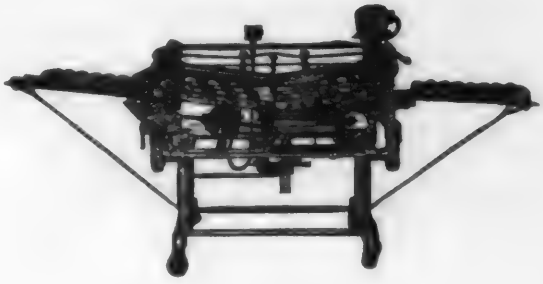

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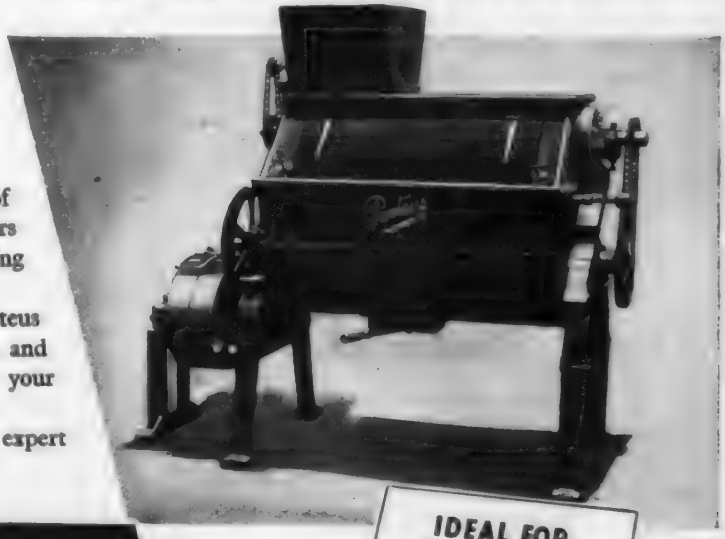

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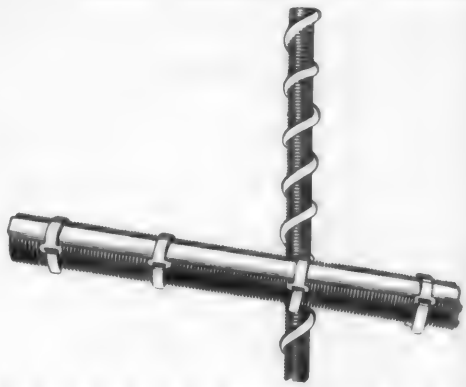

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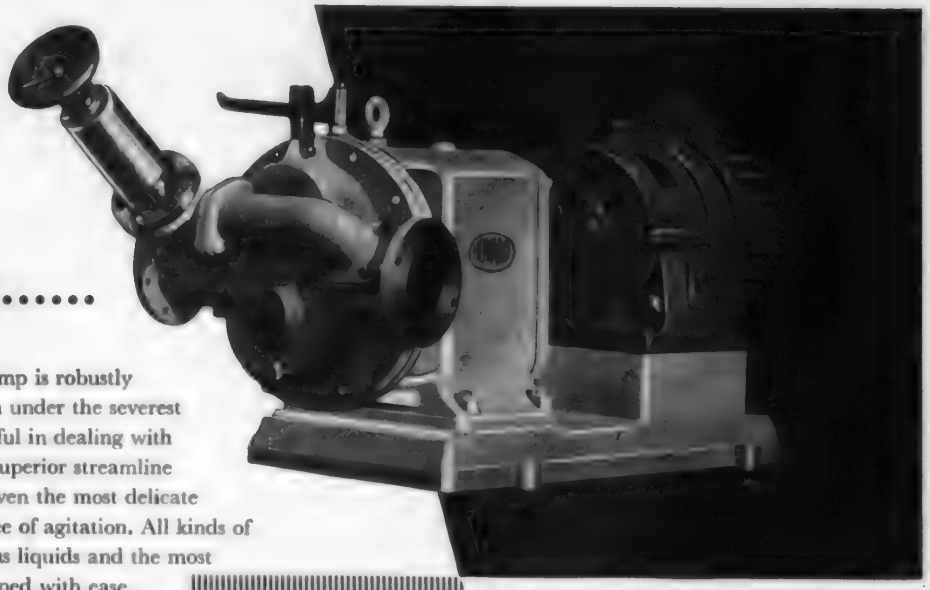

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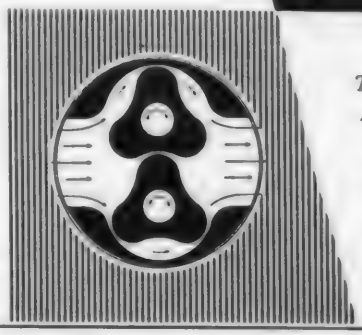

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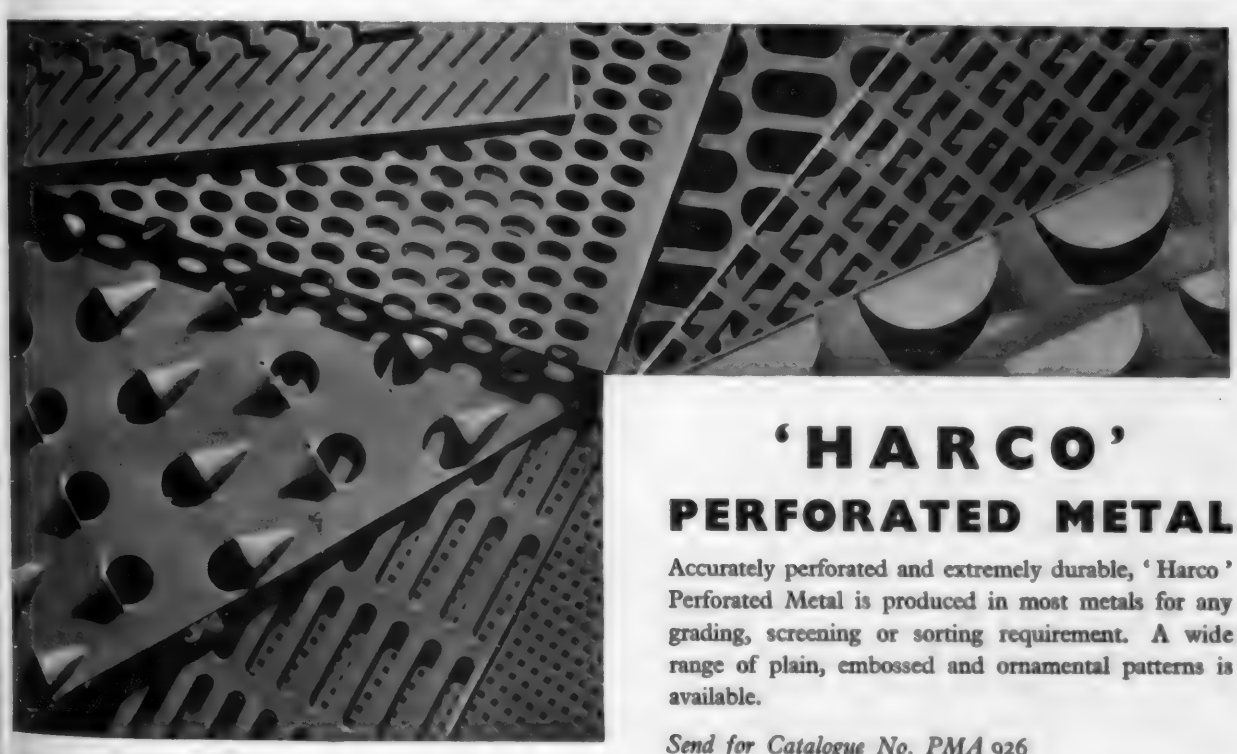

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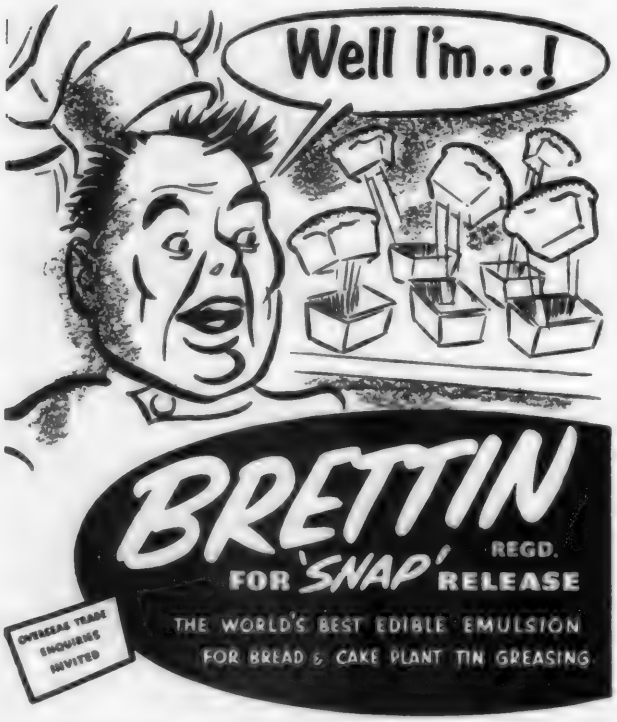

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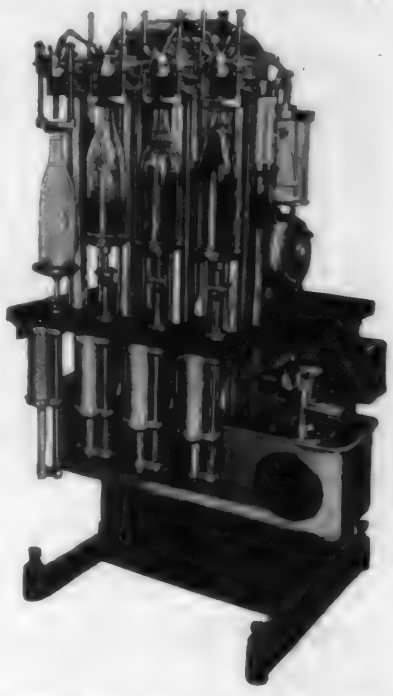

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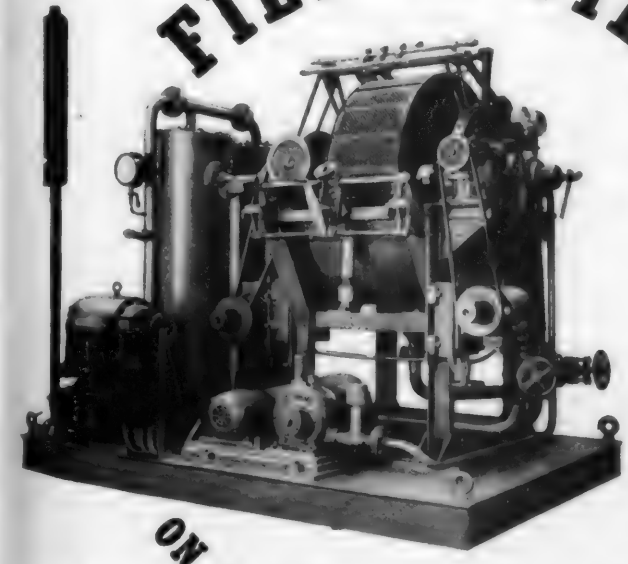

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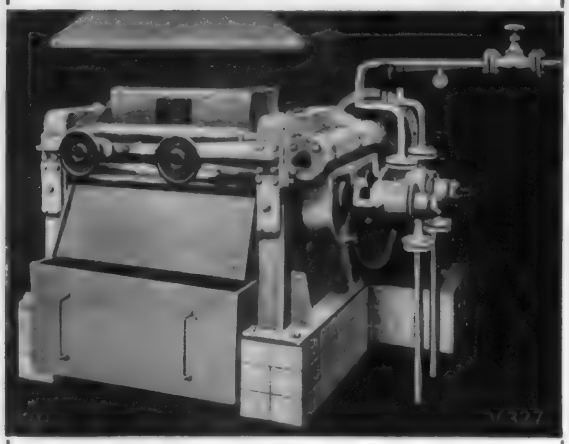

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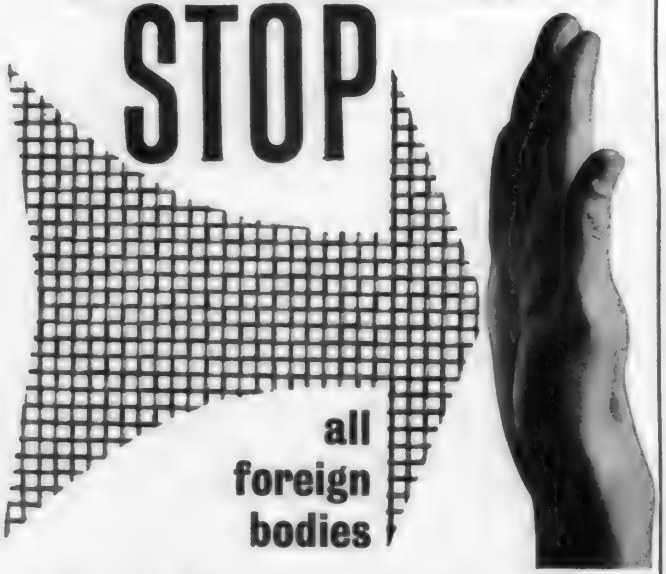

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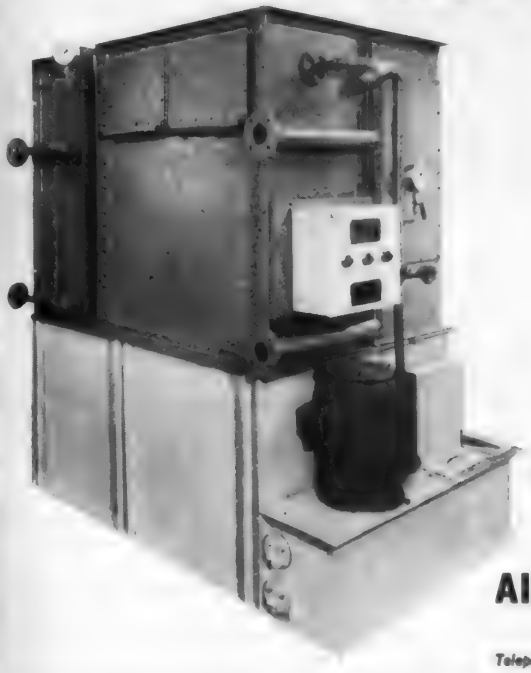

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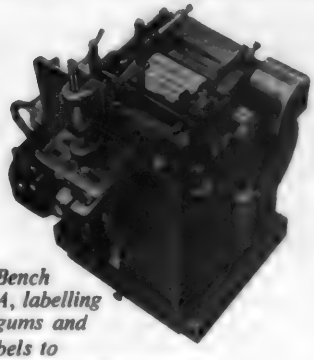

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FOOD Chemist required to take charge of a small Food Laboratory with a well established London firm manufacturing sugar confectionery, jellies, etc. A qualified person is required with some knowledge of food chemistry and technology. Experience in sugar confectionery and jelly production is preferable but not essential. Salary according to qualifications and experience.—Apply to Box B5201.

SAUSAGE Maker and/or Cannery Production Controller required. Salary not less than £1,000 a year. Full experience absolutely essential. Superannuated. Reply stating full details to Managing Director.—Box B5202.

THE UNIVERSITY OF LEEDS

Applications are invited for Imperial Chemical Industries Limited Research Fellowships in Bacteriology, Biochemistry, Biomolecular Structure, Botany (Plant Biochemistry and Biophysics), Chemical Engineering, Chemistry, Chemistry of Leather Manufacture, Chemotherapy, Colour Chemistry and Dyeing, Engineering (Civil, Electrical or Mechanical), Fuel and Refractories, Geology (including Geochemistry), Metallurgy, Mining (Selective Flotation and Geophysical Surveying), Pharmacology, Physics, Physiology or Textile Industries (Chemistry of High Polymers (keratin and man-made fibres), Textile Technology and Wool Textile Engineering). The Fellowships will be of an annual value within the range £600-£900 a year according to qualifications and experience and will normally be tenable for three years. Further particulars can be obtained on request. Three copies of applications (one in the case of applicants from overseas), together with the names of two referees, should reach the Registrar, the University, Leeds, 2, not later than April 14, 1956.

THE British Baking Industries Research Association proposes further extending its research services in the interests of its members. In this connection it is desired to appoint a Baker who has specialised in flour confectionery and possessing a technological background who, apart from working at headquarters, must be willing to travel throughout the British Isles. The successful candidate will be expected to convey information on the Association's work to Members and to collect data and/or, whenever possible, give immediate practical advice on their production problems. The post is a permanent one with a commencing salary of the order of £800 to £1,000 per annum. There are alternative pension schemes depending on the applicant's qualifications. Applications, which should include details of age, education, experience and other relevant information, should be made in writing as soon as possible to the Director of Research, Baking Industries Research Station, Chorleywood, Herts., and be accompanied by two recent testimonials and the names of two referees.

FOREMAN required to take charge of the Chocolate Manufacturing department of a large London Food factory. Daily production runs from 10 to 20 tons. Applicants must submit evidence of thorough training and wide experience in all stages from raw beans to conched chocolate. Remuneration about £16 p.w. Excellent working conditions.—Write to Box F.M.549, c/o 191, Gresham House, E.C.2.

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SITUATIONS VACANT

THE Milk Marketing Board requires a Graduate Chemist (male or female) to be responsible to their Chief Chemist for the supervision and organisation of the routine analytical work in its Central Laboratory at Thames Ditton. Applicants must have the ability to control a staff of about twenty. A knowledge of microbiology would be an advantage. Salary according to age, qualifications and experience. Applications in writing to the Establishment Officer, Milk Marketing Board, Thames Ditton, Surrey.

APPLICATIONS are invited for a male Supervisor in the Meat Canning Industry, South-West area. Applicants must have experience of Ham Canning, and to be able to control staff. Knowledge of other meat packs an advantage. Please supply details of age, experience and salary required in strict confidence.—Box B5209.

PRODUCTION Chemist required for expanding British branch of Revlon International Corporation marketing national advertised cosmetic products. Factory situated in South Wales. Applicant should preferably have Chemistry degrees or equivalent qualification. Experience should have included work on manufacturing although not necessarily in cosmetics and should not have been confined to the laboratory. The position calls for a man with initiative and drive and the ability to supervise manufacturing staff and will command commensurate salary. Applicant should submit full details in writing including age, education, training and experience together with salaries earned to G. MacNab, Revlon International Corporation, 21, Grosvenor Street, W.1.

A Technician is needed for a Biscuit Factory in Lebanon, whose field of specification would be the making of all kinds of biscuit and would have practised the job for a period not less than 10 years.—He can send his conditions and his age to Beirut-Lebanon P.O.B. 369.

FISONS Milk Products Ltd. require a Chief Chemist for their Coleraine, Northern Ireland, factory. This factory is engaged in processing milk (not retail distribution) and it is intended to introduce new products based on milk as raw material. The man appointed will be responsible for the routine examination of raw materials and finished products and for the supervision of the development departments. Applicants, who should not be older than 40, should preferably have a good class degree in chemistry and some knowledge of bacteriology, microbiology and biochemistry coupled with a few years experience in a senior position in the food manufacturing industry. This is a senior position, is pensionable and carries an appropriate salary. The Company is a member of the Fisons Group, and forms part of the Genatosan Organisation.—Applications should be sent to Fisons Milk Products Ltd., Loughborough, Leicestershire.

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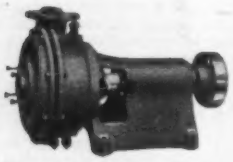

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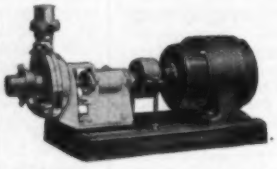

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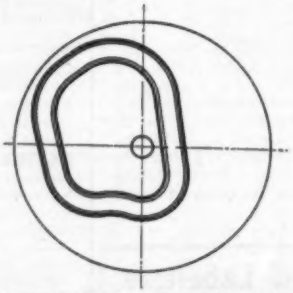

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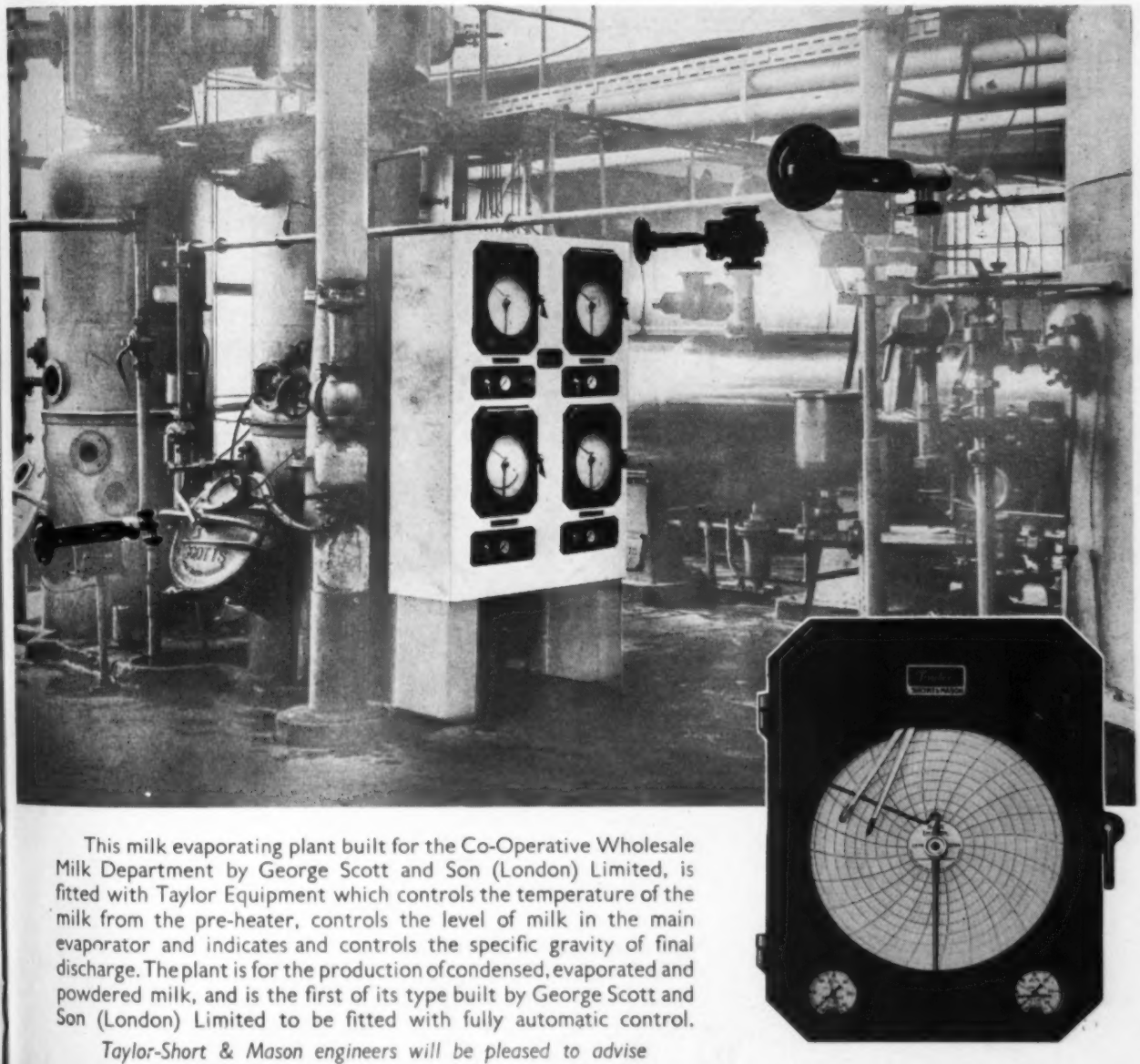

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